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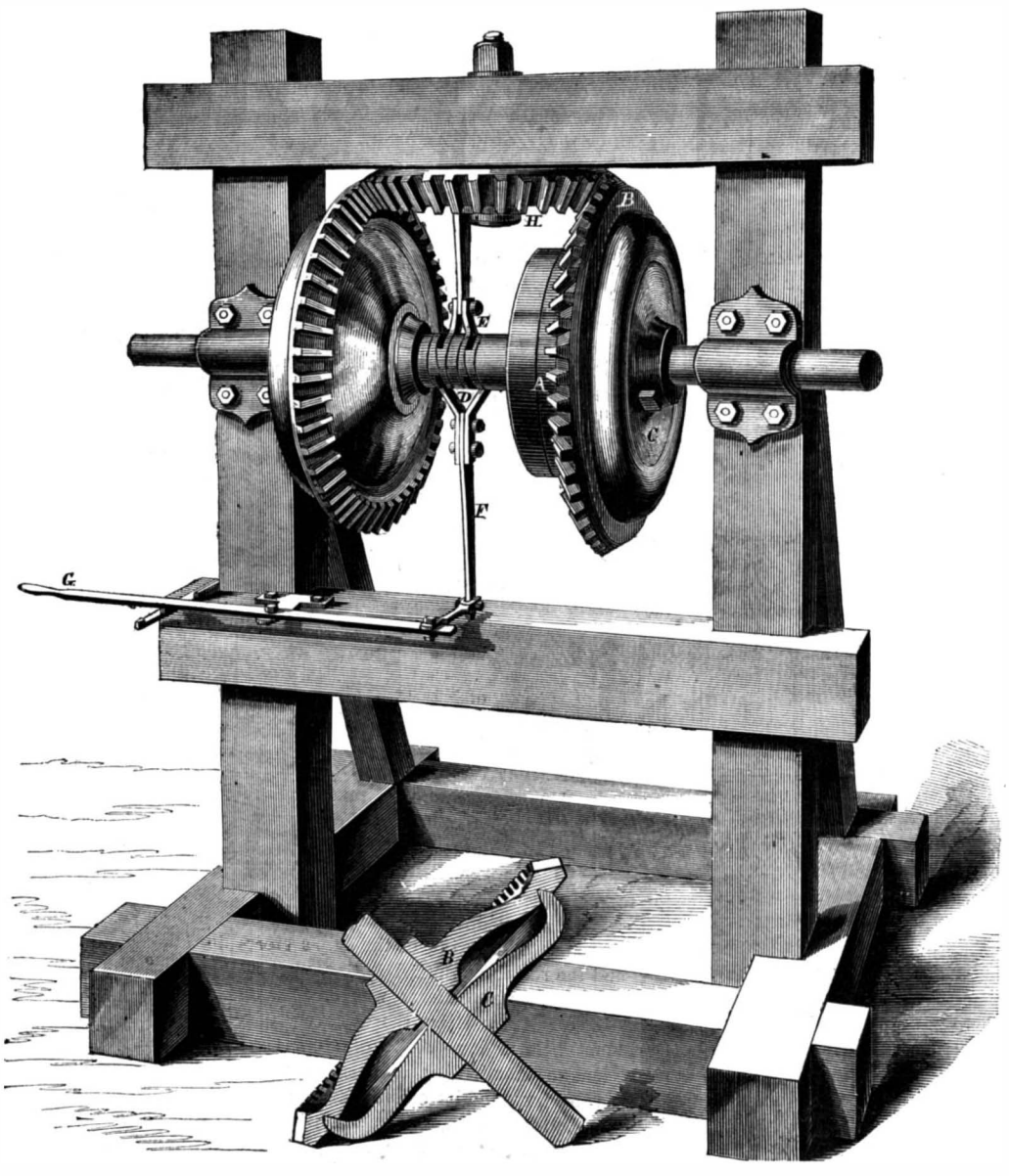
Improved Hoisting Apparatus.

In all heavy manufacturing and mining operations a cheap, convenient and easily-managed hoisting apparatus is of the greatest utility. The one illustrated in the engravings published herewith comprises all these requisites, and will be found extremely useful in places where hoisting machinery is required. For raising ore out of shafts in mines, or removing the refuse which would otherwise impede operations, this arrangement will be found a desirable one. By the use of it two buckets can be operated at once—hoisted or lowered as the shaft is thrown into communication with one or the other set of gears alternately; thus two shafts in mines may be worked by having a line of iron shafting extending over the mouths of both pits; one man being able to care for both buckets.



M'INTYRE & REEVES'S HOISTING APPARATUS.

The construction of this machinery is as follows:—The frame has a pulley, A, upon it, one of which is secured to the cog wheel, B. This gear has a V-shaped groove turned in the back, in which a strong metallic disk, C, fits accurately.

The pulley, A, is loose on the shaft but the disk is keyed to it. A similar wheel is set on the other end of the shaft; between the two there is a boss, D. which has a jaw, E, embraced by it. This jaw has two inclined faces against which similar faces worked on the lever, F (also suspended to the main shaft), act. It will be seen that when the lever, G, on the frame below is moved to or from the reader, the inclines work against each other, and thereby spread apart. The motion thus obtained is transferred to the gears, B, which are pushed up to the disk, C, and engaged with it so firmly by means of the adhesion of one to the other that a great weight can be raised without either of the wheels slipping. By the use of the inclined faces no end pressure is brought upon the main shaft, and it revolves easily and freely in its journals without heating. The auxiliary gear, H, is merely to transmit power from the main driver, A. A patent for this arrangement is now pending through the Scientific American Patent Agency. Further information can be had by addressing the inventors, McIntyre & Reeves, Central City, Colorado Territory.

THE new fort, building upon the site of Fort Hale, to defend New Haven harbor, will be the largest fortification in the State, and capable of withstanding the most serious naval attack.

TRACTION ENGINES.

Any one who has watched the long teams attached to heavy trucks transporting bulky and ponderous articles through the city streets must have been struck with the unwieldy and awkward character of the operation. The lesser vehicles prudently keep clear of these leviathans, and the most reckless omnibus driver does not venture to encounter one of them. The truck is a heavy load of itself, and we are told that there is a city ordinance against the passage of the largest of them on account of the injury they do to the pavements; this seems to be practically nullified so far as any prohibition is concerned.

In England they manage this thing much better. They have traction engines—steam power—which run in and out of crowded streets without accident or frightening timid horses. This is no new thing in Great Britain, but with us it is unknown, and it seems only reasonable to advocate its adoption. Why are they not tried? Why does not Mr. Herring the safe-maker introduce one to carry his safes. He might not only transport them to and fro, but hoist them to the top of the highest warehouses quickly and safely. We scoff at Englishmen as "old fogies," and behind the age, but in very many important matters, and this is one of them, they are far ahead of us. Why shall we not have traction engines?

A Geological Phenomenon.

The Chicago *Tribune* says:—"The work on the tunnel is suspended, owing to the breaking out of a spring in the bottom of the shore shaft, the singular feature of which is that it fills the well to the depth of two and a half feet and then stops. It will have to be pumped out while the inverted groin at the bottom is turned; the shaft will be bricked up before the tunnel is commenced. It is expected that the work will proceed without interruption when once the shaft is bricked and cemented. A boulder was found at a depth of about 75 feet, bearing the peculiar grooves and parallel scratches which belong to the glacial movement, as expounded by Agassiz. Admitting his theory—that these grooves give conclusive proof of glacial connection and motion—a wide field of research is opened. The question recurs: "How did it get there?" Had it been found in an alluvial formation the solution would have been comparatively easy; but the clay which enveloped it is not alluvial, it belongs certainly to a supertertiary order, but there is no evidence of stratification. It is singular, too, that in this region the secondary and tertiary beds appear to be entirely wanting; the drift formation reposing directly on the silurian. Very few other instances of this are to be found on the globe, and it is universally considered by geologists that the fact points to very sudden changes, involving disrupting processes, of which we, in this distant day, can only form a very faint idea. Those formations, here missing, are made under water, and the great changes which, since the primary igneous eruptions have occurred on the face of our globe, have been caused, as a rule, not by convulsive elevation, but by gradual upheaval, continued through a course of centuries."

Present of a Locomotive.

We have received a magnificent locomotive engine from the "Jersey City Locomotive Works." Draughtsmen, designers and machinists have done their work with such dexterity and scrupulous accuracy that a first-class machine is the result, and although there is no steam up, we have no doubt that if we opened

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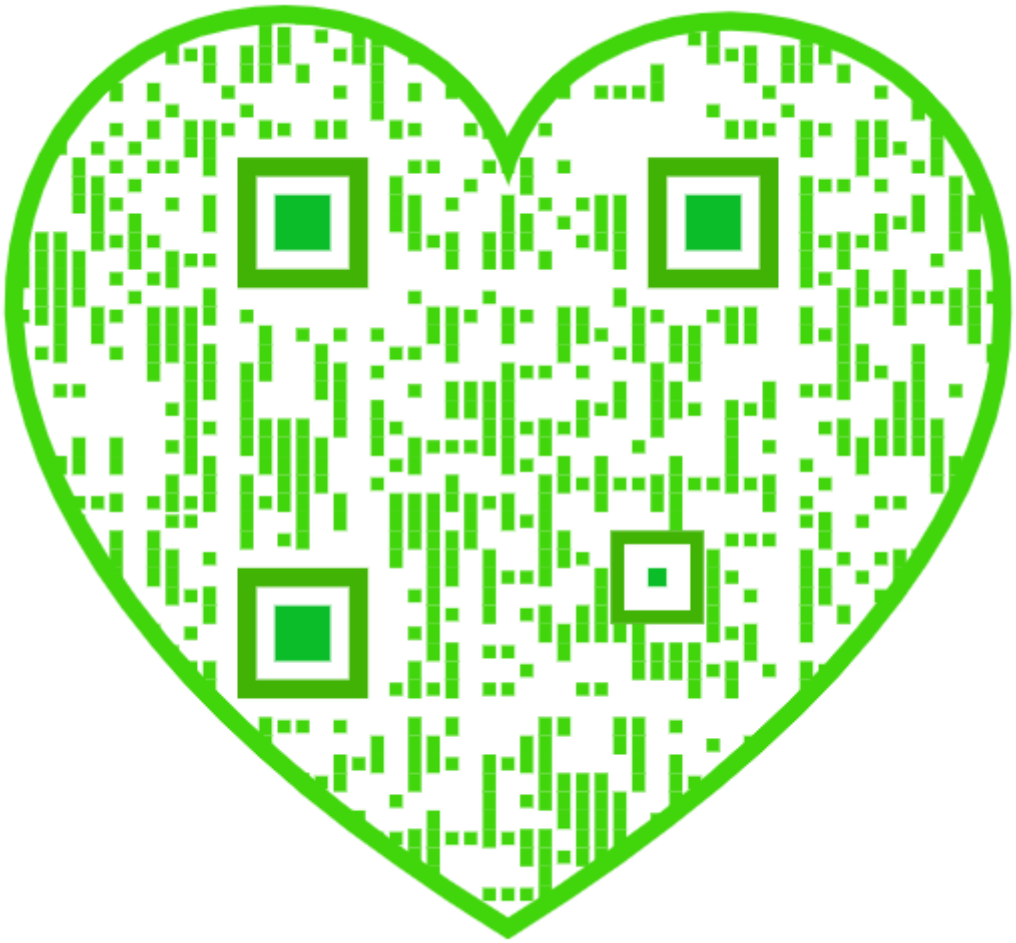

the throttle ever so slightly the whole would revolve and bear us softly away. The reader ought to be informed that we are speaking of a photograph, but so faithful is it, and so beautifully taken, that it is hard to believe it a mere counterfeit presentment and not veritable brass, steel and iron. The engines built by the Jersey City Locomotive Works are first-class, and we hope shortly to pay them a visit when we shall give more extended details.

COMMISSIONER HOLLOWAY ON FIRE-ARMS.

From the remarks on fire-arms and other implements of war in the Introductory Report of the Commissioner of Patents for 1863, we take the following extracts:—

BREECH-LOADING CANNON.

There are peculiar obstacles to the application of the breech-loading principle to heavy guns which leave but little encouragement to the hope of any great success in this direction. The fact that the strength of material does not increase in the ratio of size, while the explosive energy of the powder is augmented at least as rapidly as its increase of mass, the necessity of adding considerably to the bulk or weight of a gun when it is divided or pierced at the point of greatest strain—and this in a weapon already too unwieldy—and the difficulty of securing the fitting of any considerable moving parts or surfaces exposed to extreme inequalities of temperature, all appear to stand in the way of any available extension of the system, excepting, possibly, in the lightest artillery.

REVOLVING TURRETS.

Amid many minor matters, the system of revolving turrets for the use of ordnance may be mentioned as a subject developed and patented during the present national struggle, though really invented many years ago. This method of fortification, or of operating cannon, applicable equally to land and naval defences, presents the two great advantages of a more ready direction to, and control of, an enemy's position, and of a more rapid concentration of fire upon any given point. Several applications of steam to the working or maneuvering of heavy guns have also been patented within the last year or two.

BREECH-LOADING SMALL-ARMS.

In view of the very striking advantages presented by breech-loaders in their greater ease and safety of loading, and their rapidity of firing, as well as in the increased facility of handling the arm in many straitened conditions of ambuscade, etc., there seems to be every reason to expect that this class of weapons must before long come largely into use in modern warfare, and probably ultimately displace entirely the present system of loading at the muzzle.

It not unfrequently occurs that the actual value of such an arm, in practical experience, bears an inverse ratio to the amount of ingenuity, skill, and labor expended on its organization and production; and modifications apparently so slight and simple as scarcely to deserve the protection of a patent will sometimes be found to confer a largely increased practical efficiency. It appears evident that, for the requirements of the military service, an arm must be strong and simple in its construction, having few moving parts, and not liable to be deranged by rough and careless usage.

The "Re d'Italia."

This ship, admirable in design and splendid in her proportions and equipments, has proved herself one of the best, if not the very finest, vessel of her class in the world. She is, as our readers will remember, an iron-clad broadside frigate. She is about 285 feet length, 55 feet beam; armament, 36 8-inch rifled guns; draft of water, when completely equipped for service, limited by contract to 24 feet 9 inches; her contract speed, when fully equipped for service, fixed at 12 knots at sea, and capacity of coal bunkers 650 tuns. The iron cuirass, consisting of nine courses, to extend from a line six feet below deep-load water-line to the spar-deck; lower courses 4¾ inches thick; upper courses 4½ inches thick.

The performance of this vessel, on her recent trip to Italy, having been unfavorably commented upon by some of the daily press, Mr. Wm. H. Webb has made public the following facts:—

"The seven lower courses were in position on the ship's sides when she made her voyage across the ocean, the two upper courses (that part of the cuirass between the ports, and a narrow course above the ports, weighing much less *pro rata* than the lower courses) were—not by my wish, but at the request of the Italian Government—stowed partly in the hold and partly on the berth deck. All her armament was not on board (only eight guns), but the deficiency in its weight was more than counterbalanced by excess of weight in coal, spars and duplicate machinery, stores, etc. On the gun-deck were stowed most of the duplicate machinery, and also 218 tuns of coal in temporary bunkers (a weight greater than that of her guns, and greater than she will ever have on her gun-deck when fully armed and equipped). All her bunkers were full over her shell rooms, forward and after hold, and every available space were filled with coal; and in addition to this, she had on board four month's provisions and stores, cattle and other freight. When going to sea from New York she drew one foot water more than she will ever draw when put in commission ready for service, as was proved by the quantity of coal, stores, water, etc., put on board by requirement of contract before making trial trips at sea, fully equal to all the weights she will have on board when in service. With the disadvantage of leaving port much deeper loaded than ever intended she should be, or ever will be required by the service in which she will be engaged, her performance on the recent passage is unequaled by that of any iron-clad vessel yet built in any country, as proved by the record. And what is most remarkable, at the termination of the voyage, the ship gave no evidence of the slightest straining from the weight of the iron on her sides. Even the cement in the seams of the cuirass was not started in the slightest degree; and the condition of the engines was such that the chief engineer, in forty-eight hours after arrival in Naples, reported them ready for another trip of 5,000 miles. By the log the whole distance actually run on the voyage from New York to Naples was 4,920 miles, the actual running time was 400 hours (not including stoppage of 50 hours at the Azores, and 20 hours at Gibraltar); the whole consumption of coal was 1,040 tuns—an average of 2¼ tuns per hour, 3,000 miles of the whole distance were steamed with 4 boilers and the remainder of the distance with 5 boilers—her sixth not having been used—and while going up the Mediterranean, she steamed during a whole watch at the rate of 14 knots an hour."

BREAK-DOWN OF AN ENGLISH TURRET SHIP.

The London *Engineer*, of May 13th, gives an account of the trial of the *Royal Sovereign*, from which we take the following extracts:—

"The *Royal Sovereign* turret-ship has at length been fairly under steam, having been taken out of Portsmouth harbor for a preliminary trial of her machinery. A wonderful change has been effected in her appearance by her conversion from a three-decked steamship to her present form. Like all vessels of the monitor type, the ship will, perhaps, never be considered graceful. The trying of the ship's steering power, and the run through Stoke's Bay, were all very satisfactory, but some alarm was created on board immediately afterwards by the discovery of a serious accident below. An escape of steam had taken place, and an examination disclosed the fact that the stop valve box, and its communication with the steam pipe, had been torn off the after boilers. The necessary measures were at once taken, and the mischief happily ended there. The boilers of the ship stand in the usual position, face to face, with the steam pipe running fore and aft between them, the communication between the steam pipe and the boiler being formed by a pipe from the main steam pipe communicating with the valve box on the boiler. So long as the boiler retains its original position, this communication, it is evident, would remain intact; but any severe working of the ship, or alteration of the form of the ship's bottom, would be attended with great risk of injury to the valve box or pipe. It is believed that, in the present case, the *Royal Sovereign's* bottom has altered in its form since she has been out of dock, and that this alteration has tipped up the back of the boilers, where they rest on the vessel's bilge, and, throwing their faces towards each other, the strain has thus been thrown upon the valve boxes and pipes, and hence the accident. The theory assigned as the cause of the accident is this:—Immediately over the damaged boilers (which are the two after ones) is fixed one of the ship's turrets, weighing with its gun and carriage 113 tuns. This weight does not rest on the pivot, it is distributed over the circumference of the iron road on which the turret revolves, but the weight is in reality supported by four iron columns under the deck and immediately in front of the boilers. These columns stand in a space of eight feet, and, resting in that small space on the ship's bottom in the vicinity of the keel the latter has bulged out under the pressure, collapsed slightly at the sides, and thus displaced the boilers. The ship will be placed in dock, when a further investigation will be made. The turret must be taken out of the ship and the boilers re-set in their new form, which is possibly all that may be required to render the ship efficient for the purpose for which she has been converted."

Boiler Explosion in Detroit.

Another tremendous boiler explosion occurred in Detroit, Mich., recently. The propeller *Nile* was lying at the dock in Detroit, about to start for Milwaukee, when her boiler suddenly burst, and blew the craft into a thousand pieces. The wreck of the shattered steamer lay strewn about for a distance of several blocks; the greater portion of the boiler itself lay in the middle of First street, a distance of ten rods from the water's edge; buildings in the vicinity were torn to pieces; large and massive brick walls were perforated by large timbers driven through them, like forest leaves riddled with bullets. For miles around the fragments of the wreck were hurled through the air, and we are informed struck the roofs of houses in the neighboring town of Windsor, in Canada, across the river, damaging them to a considerable extent. A stick of timber about fourteen feet in length, and ten by sixteen inches square, was blown about 400 feet, through the rear walls of a shoe-store, and instantly killed a shoemaker at work on his bench. Some nine persons were killed and some thirty wounded.

The Supervising Inspector, Mr. A. Guthrie, of Chicago, together with Capt. P. J. Ralph, the Local Inspector of Detroit, having as fully as possible, under the circumstances, investigated the causes of the explosion of the propeller *Nile*, by a careful examination of the boiler and wreck, and by testimony taken from the survivors, have come to the conclusion that the cause was attributable to a want of water in the boiler, and that this was produced from negligence and carelessness of the engineers in charge at the time. Perhaps some of our readers in Detroit will give further and more explicit information about the accident.

Heroism of a Naval Engineer.

During the engagement between the rebel ram, *Albermarle*, and the *Sassacus*, a wooden gun-boat, the latter received a shot through her boiler, which caused a large quantity of steam to escape directly into the ship. A writer on board the *Sassacus* thus describes the determination with which the chief engineer of the *Sassacus*—whose name is omitted by some great oversight—stuck to his post:— "The situation was appalling. The shrieks of the scalded and dying, as they frantically rushed up from below, with their shrivelled flesh hanging in shreds upon their tortured limbs, the engine beyond control, surging and revolving without guide or check, abandoned by all save one, who, scalded, blackened, sightless, still stood like a hero to his post. Alone, amidst that mass of unloosed steam and uncontrollable machinery, the chief engineer of the *Sassacus* remained, calling to his men to return with him into the fire-room, to drag the fires from beneath the uninjured boiler, which was now in imminent danger of explosion. Let his name be long remembered by the two hundred beings whose lives were saved in that fearful moment by his more than heroic fortitude and exertion. There were no means of instantly cutting off communication between the two boilers, and all the steam contained in both rushed out like a flash, exposing the ship to a more fearful catastrophe, should our brave engineers be too late in drawing the heavy fires which threatened our destruction." Who is he? what is his name?

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Improved Lock or Fastening.—This invention is a strong, simple and cheap lock or fastening, and is applicable to an infinite number of purposes. It effectually locks together sections of portable buildings, stair hand-rails, sliding doors of railroad cars, ships or houses; windows, bedsteads, shoe lasts, pianos, piano-legs, fences, etc.; in fact any two surfaces can locked together or unlocked in a few moments with this bolt; and when thrown into its place the bolt cannot be blown out with powder, thus making a very simple, safe and desirable mode of locking. It is the invention of William Sellers, of 127 East 37th street, New York city

Furnace for utilizing Slag.—This invention relates to an improved furnace for separating the more fusible from the less fusible portion of slag, the former being used as a flux in the melting of iron, and the latter used as a lining for puddling furnaces to protect the metal lining. At present the slag is fused in an ordinary furnace, the more fusible portion as it liquifies descending by its own gravity through the mass and passing out at the bottom; and when the charge in the furnace has been subjected to a requisite degree of heat a sufficient length of time to separate the more fusible from the less fusible portion, the fires are extinguished and the less fusible portion removed, when the furnace is again charged, the fires kindled, and the operation repeated. This mode is attended with a considerable loss of time, an objection which this invention completely obviates, as with the latter the operation is rendered continuous, the fusing and separating processes being performed simultaneously, and the furnace charged from time to time, as required, under constant fires—the latter not being required to be extinguished in any case, excepting only when the furnace requires to be repaired. This invention is by Julius Hornig, who may be addressed at the Troy Iron Works, Troy, N. Y.

Atmospheric Regulator.—This regulator is composed principally of an air pump or bellows which is driven by the motor to be regulated, for the purpose of forcing air into a cylinder containing a piston upon which the pressure of the air, so forced into the cylinder, acts to bring into operation a friction brake or to operate upon a throttle or other valve, as may be required, to control the speed of the engine or motor. The invention consists, first, in a stationary valve applied within the air cylinder to operate in combination with a hole in the piston thereof, for the purpose of regulating the escape of the compressed air through the said hole, and thereby making the regulator more sensitive and its action quicker. It consists, secondly, in a novel mode of applying a friction brake in combination with such regulator, to act upon the fly-wheel or other wheel upon the shaft of the motor. Benj. Mackerley, of Paint Post-office, Ohio, is the inventor of this improvement.

Staining Wood.—The object of this invention is to produce on cheap or inferior wood, such as pine, maple, etc., a stain similar to that of mahogany or other costly wood, and to give to the surface of said cheap wood a rich and polished appearance. The invention consists in a composition of size or alkaline solution and terra japnoica, mixed together in such proportion as may be necessary to produce the desired effect. Marshall Turley, of Council Bluffs, Iowa, is the inventor of the above.

Wind Wheel.—This invention consists in the arrangement of regulating fans which are rigidly connected with the main shaft of the wind wheel, and each of which is fitted with a slotted guide to receive an arm or dog which projects from the edge of one of the main sails in combination with a friction brake and with said main sails which rotate freely on arbors projecting from a hub that is attached to the main shaft by means of a spring, and allowed to rotate independent of said shaft, in such a manner that by the combined action of the slotted guides, dogs, and spring, the main sails are turned in the wind, and kept there until the speed of the wind wheel exceeds that of the regulating fans, or until the motion of the latter is checked by the friction brake, when the main sails are turned more or less edgeways against the wind, and the speed of the wind wheel is kept within the desired limits, or its motion stopped entirely. The above invention is by Jonathan Troop, of Erie, Pa.

A Skillful Piece of Engineering.

The Union fleet of iron-clad gun-boats, built at great expense during the last two years, recently went up the Red river, at high water, by which they were enabled to pass over shoals otherwise unnavigable by them. The water fell, however, after they reached their destination, and all natural means of extrication from the situation seemed cut off. Admiral Porter's report is so clear and connected an account of the operations by which the ships were rescued that we publish it herewith:—

Lieutenant-Colonel Bailey, Acting Engineer of the 19th Army Corps, proposed a plan for building a series of dams across the rocks at the falls and raising the water high enough to let the vessels pass over. This proposition looked like madness, and the best engineers ridiculed it; but Col. Bailey was so sanguine of success, that I requested Gen. Banks to have it done, and he entered heartily into the work. Provisions were short and the forage was almost out, and the dam was promised to be finished in ten days, or the army would have to leave us. I was doubtful about the time, but had no doubt about the ultimate success, if time would only permit. Gen. Banks placed at the disposal of Col. Bailey all the force he required, consisting of some 3,000 men and two or three hundred wagons. All the neighboring steam mills were torn down for material, two or three regiments of Maine men were set to work felling trees, and on the second day after my arrival in Alexandria, from Grand Ecore, the work had fairly begun. Trees were falling with great rapidity; teams were moving in all directions, bringing in brick and stone; quarries were opened; flatboats were built, to bring stones down from above; and every man seemed to be working with a vigor I have seldom seen equaled. while perhaps not one in fifty believed in the success of the undertaking.

These falls are about a mile in length, filled with rugged rocks, over which, at the present stage of water, it seemed to be impossible to make a channel. The work was commenced by running out from the left bank of the river a tree dam—made of the bodies of very large trees, brush, brick, and stone, cross-tied with other heavy timber, and strengthened in every way which ingenuity could devise. This was run out about three hundred feet into the river; four large coal barges were then filled with brick and sunk at the end of it. From the right bank of the river cribs filled with stone were built out to meet the barges. All of which was successfully accomplished, notwithstanding there was a current running of nine miles an hour, which threatened to sweep everything before it.

The dam had nearly reached completion in eight days' working time, and the water had risen sufficiently on the upper falls to allow the *Fort Hindman*, *Ossage*, and *Neosho*, to get down and be ready to pass the dam. In another day it would have been high enough to enable all the other vessels to pass the upper falls. Unfortunately, on the morning of the 9th inst., the pressure of water became so great that it swept away two of the stone barges, which swung in below the dam on one side. Seeing this unfortunate accident, I jumped on a horse and rode up to where the upper vessels were anchored, and ordered the *Lexington* to pass the upper falls, if possible, and immediately attempt to go through the dam. I thought I might be able to save the four vessels below, not knowing whether the persons employed on the work would ever have the heart to renew their enterprise.

The *Lexington* succeeded in getting over the upper falls just in time—the water rapidly falling as she was passing over. She then steered directly for the opening in the dam, through which the water was rushing so furiously that it seemed as if nothing but destruction awaited her. Thousands of beating hearts looked on, anxious for the result. The silence was so great as the *Lexington* approached the dam that a pin might almost be heard to fall. She entered the gap with a full head of steam on, pitched down the roaring torrent, made two or three spasmodic rolls, hung for a moment on the rocks below, was then swept into deep water by the current, and rounded to safely into the bank. Thirty thousand voices rose in one deafening cheer, and universal joy seemed to pervade the face of every man present.

The *Neosho*, *Hindman*, and *Ossage*, were then got through, when it became necessary to repair the dam, which had been injured by the breaking away of the two barges. The noble-hearted soldiers seeing their labor of the last eight days swept away in a moment, cheerfully went to work to repair damages, being confident now that all the gunboats would be finally brought over. These men had been working for eight days and nights up to their necks in water in the broiling sun, cutting trees and wheeling bricks, and nothing but good humor prevailed amongst them. The force of the water and the current being too great to construct a continuous dam of 600 feet across the river in so short a time, Col. Bailey determined to leave a gap of fifty-five feet in the dam, and build a series of wing dams on the upper falls. This was accomplished in three days' time, and on the 11th inst., the *Mound City*, *Carondelet*, and *Pittsburgh*. came over the upper falls, a good deal of labor having been expended in hauling them through, the channel being very crooked, scarcely wide enough for them. Next day the *Ozark*, *Louisville*, *Chillicothe*, and two tugs also succeeded in crossing the upper falls. Immediately afterwards the *Mound City*, *Carondelet*, and *Pittsburgh* started in succession to pass the dam—all their hatches battened down and every precaution taken to prevent accident. The passage of these vessels was a most beautiful sight, only to be realized when seen. The other vessels were all got over safely. They were then coaled, ammunition replaced, and all steamed down the river, with the convoy of transports in company. A good deal of difficulty was anticipated in getting over the bars in lower Red river—depth of water reported only five feet—gunboats were drawing six. Providentially we had a rise from the back water of the Mississippi, that river being very high at that time, the back water extending to Alexandria, one hundred and fifty miles distant, enabling us to pass all the bars and obstructions with safety.

Col. Bailey, the engineer, who saved the gunboat fleet, is a Wisconsin man. He entered the service as captain in the 4th Wisconsin Volunteers, July 2d, 1861; promoted colonel June 11th, 1863, for meritorious conduct in the field and for highly distinguished services before Port Hudson.

The Best Work on Chemistry.

It is the opinion of the most eminent chemists in this country that Miller's Elements of Chemistry is the best work on the science in the English language. The English edition is very costly, and its republication in cheaper form is a valuable service to the American public. This has been undertaken by John Wiley, 535 Broadway, New York, and we have received from him the first volume, being the portion devoted to chemical physics. It is from the third English edition, which was published in 1863, and contains the latest discoveries in dialysis, heat, and electrolysis, by Graham, Renault, Tyndall, and Andrews. We give one extract to illustrate the plain and easy style of the writer:—

"What the real size of these ultimate particles may be, we have no means of determining, although, as will be seen hereafter, there are strong grounds for believing that the divisibility of matter, extreme as it is, has its assigned and definite limits. Experience, however, shows that whatever be the form of matter selected for our experiments, that divisibility may be manifested to an extent which transcends our powers of conception. The divisibility of gold is often given in illustration of this point. In the ordinary process of making gold leaf, a single grain of gold is hammered out until it covers a square space seven inches in the side. Each square inch of this may be cut into 100 strips, and each strip into 100 pieces, each of which is distinctly visible to the unaided eye. A single grain of gold may thus, by mechanical means, be subdivided into $49 \times 100 \times 100 = 490{,}000$ visible pieces. But this is not all; if attached to a piece of glass, this gold leaf may be subdivided still further; 10,000 parallel lines may be ruled in the space of one single inch, so that a square inch of gold leaf, weighing $\frac{1}{4\,9}$ of a grain, may be cut into 10,000 times 10,000 or 100,000,000 pieces, or an entire grain into 4,900,000,000 fragments—each of which is visible by means of the microscope. Yet we are quite sure that we have not even approached the possible limits of subdivision, because, in coating silver wire, the covering of gold is far thinner than the gold leaf originally attached to it, since in drawing down the gilt wire the gold continues to become thinner and thinner each time, in proportion as the silver wire itself is reduced in thickness."

COMPLICATED superscriptions on letters are no novelty, but we rather think that the address of one subscriber, in India, to the SCIENTIFIC AMERICAN, may fairly challenge comparison with any we have seen published. This gentleman's paper is directed as follows:—"Vinaeck Gungadhur Shastru, (care of Mr. Tukkaram Narayan Silladar,) at Shastru Hall, Breach Candy, Mahaluxomee roads, (near the Hon. Juggunath Sunkersett's Garden House,) Gowalla, Bombay, India. (Overland, via Marseilles.)"

THE Siberian telegraph line is working to Queenstown, Ireland, from Irkutsk, Siberia, a distance of six thousand five hundred miles. A despatch was transmitted the whole distance in two hours, a great feat, making a fair allowance for gain in apparent time.

MILWAUKEE, it is said, manufactures more leather than any city in the West. The Wisconsin Leather Company alone, last year produced more than half a million dollars' worth of leather. Two additional large tanneries are now in process of building.

VOLATILE SOAP FOR REMOVING PAINT, GREASE SPOTS, ETC.—Four table-spoonfuls of spirits of hartshorn, four table-spoonfuls of alcohol, and a table spoonful of salt. Shake the whole well together in a bottle, and apply with a sponge or brush.

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PROFESSOR MORGAN'S PLAN OF PRESERVING MEAT.

We have briefly mentioned the plan for preserving meat proposed and tried by John Morgan, Esq., F.R.C.S.I., Professor of Practical and Descriptive Anatomy in the Royal College of Surgeons, Ireland' but finding Professor Morgan's paper in full in *The Weekly Agricultural Review* (Dublin), we take from it the following extracts. After arguing that salted meats cause scurvy and other diseases, in consequence of the phosphoric acid and other substances being removed by solution in the brine, he says:—

"I shall first detail the *modus operandi* of my process. The animal is killed in the usual manner by a blow on the head, causing instantaneous death. It is then turned on the back, the chest opened, the bag or pericardium, containing the heart, opened. The right side of the heart, into which all the venous or returning blood enters, is seen distended; the ear or right auricular tip, as most convenient, is opened, or its tip cut off, or an incision made into the right ventricle; another also directly into the left. The animal is turned on the side to let the blood run out. A pipe, furnished with a stop-cock and coupling at the outer end, is now introduced into the incision made in the left ventricle, and makes its way at once into the aorta. The fingers holding a piece of stout cord, are now passed round the aorta, close to the heart (including at the same time the pulmonary artery), and the cord is tied strongly over both, so that the pipe is fixed in the aorta firmly. To the outer end a coupling, connected with an india-rubber or other tube, three-fourths of an inch in diameter, 18 to 20 feet long, joins this to a vessel or tank elevated to the hight of the length of the tube; brine of ordinary strength, with a little saltpeter dissolved in it, is let on; it directly (under fifteen seconds in most cases) rushes out at the incision made either in the right auricle or ventricle before mentioned. About five gallons will suffice. This clears the smaller vessels for the next stage, which is the essential one. The brine so used can be recovered if desired, by adding a little old brine and heating. The materials to be ultimately used are now put into the tank, taking care that they are strained, and a stout clip or clamp is put on the incision in the right side of the heart. The fluid is then turned on, and directly makes its way to the right side, as before; but its exit being now prevented, and its admission into the smaller vessels being secured by the first process of clearing these vessels, as mentioned, the fluid, by the pressure and capillary attraction of minute vessels and muscular fiber, percolates through every particle of the animal, and can be seen at the moment diffusing itself in any part, by making incisions in the hide, horn, bone, and flesh, or any other parts. The quantity I use is about one gallon of brine to the cwt., a quarter to half a pound of niter, two pounds of sugar, a little spice, sauce, etc., to taste; also half an ounce of the mono-phosphoric acid, which, having the power of coagulating albumen, and forming a compound with it, retains this very desirable element in the flesh, and gives an extra supply of phosphoric acid, which is, of course, at present denied the sailor, as above stated. The use of boiling brine in the second stage I also advocate, as it coagulates the albumen, or gives a set (as it is called by cooks) to the meat. It is needless to remark that the entire animal is cured almost instantaneously.

"I would now draw attention to the further treatment of the flesh, referring to—1st, the method scientifically used; 2d, the advantages attained; 3d, the mechanical advantages; if we now consider the first part of the process complete.

"The animal is in a few hours cut up into the eight pound pieces required by the navy, and is ready for casking in the usual way, or in dry salt (all expense of preparing being done away), or for drying by being transferred to a drying-house (as in the specimens for inspection). It is obvious that it loses none of those materials abstracted by the present method of salting, so that the meat is absolutely perfect, as in fresh meat without water, having, as I hold, the additional advantages of salt, which the weight of authority is in favor of rather than against, and of sugar, now issued to the navy, along with the lemon juice; the use of sugar Liebig shows plainly is for the formation of lactic acid (which as mentioned before, he has found abstracted by the brine), and a most essential compound, not only of muscle juice, but of gastric juice, as well as an important respiratory food. I would suggest the use of 'sauer kraut,' or some other vegetable product containing lactic acid, or lactic acid itself. Sugar is, in an economic point of view, specially advantageous, as it is about two-thirds the price of meat, or less, while it improves the flavor and keeps soft the flesh, aiding also in the preservation.

"The victualing department of the navy have had a number of bullocks prepared by this method, and have shipped them to various climates to test the efficacy of the process. I subjoin a rough list of the improvements to be attained by this process:—

1. No rubbing with salt.
2. No putting in tanks of salt or labor.
3. The operation requires for a bullock only an extra time of five minutes or thereabouts.
4. No machinery required.
5. No loss of weight.
6. Diminution of taint.
7. Cure possible in other than the winter months, when meat is cheaper.
8. Not increasing the market price by purchasing so many animals together.
9. Making dried meat, containing all the nutriment, without extra expense.
10. This dried meat will make soup.
11. It can be carried conveniently.
12. Two or three days' supply would be portable (if dried) by each man without difficulty.
13. Being parboiled, or 'set,' it can, when dried, be eaten without cooking if need be.
14. Spices and flavors can be added economically.
15. Anti-scorbutic remedies or vegetable products likewise.
16. Applicable to extemporaneous use.
17. The hide and every part of the animal is cured at once.
18. Every part of the animal is cured, so that the shins, head, etc., can be used."

The Rust of Wheat and its Remedies.

From the article on "The Wheat Plant," by Lewis Bollman, of Bloomington, Ind., published in the report of the Commissioner of Agriculture, we extract the following remarks in relation to rust:—

"The oldest of our histories, the Bible, frequently alludes to it as common among the Jews, and represented it as one of the punishments inflicted on that disobedient people. They were warned that disobedience would be followed 'with blasting and with mildew;' and when thus punished, the prophet Haggai says: 'I smote you with blasting, and with mildew, and with hail, in all the labors of your hands; yet ye turned not to me, saith the Lord.' The Hebrew name for the rust, *yarcoon*, meaning a yellow color caused by moisture, is indicative of the cause and appearance of the disease then as we find them now. The Grecian and Roman writers have transmitted to us like names and causes. The Greeks called it *erusitee*, and the Romans *rubigo*. Ovid, describing the rubigalia, a religious festival established by one of the earliest rulers of Rome, makes the priest say, 'If the sun fervently heats the moist stalks, then, O dread goddess, is the opportunity for thy dread wrath. Be merciful, I pray, and withhold thy rusting hands from the crops.' In all times, and among every civilized people, this disease existed, and a moist stalk heated by a hot sun is the cause of it; hence heavy dews, precipitated by clear, cool nights, succeeded by a hot sun during the day, soon develop the disease now as it did in the most ancient periods. It was not until the microscope was invented that the true nature of the disease was known. There is a species of plant which lives on the sap of other plants, called parasite. The rust and smut are plants of this character. The microscope shows the fact that rust is a perfectly formed plant, having roots, stems, and branches, and producing seed too small for the unaided eye to discover. These exist in innumerable quantities in the atmosphere, awaiting the condition essential to their germination and development. What these are we have already seen. In the language of Ovid, they are the sun fervently beating on the moistened stalks. When this moisture proceeds from showery weather, no danger need be apprehended; but when from dews precipitated by cool nights, then the rust rapidly develops itself. Whether the moisture in drying so rapidly causes a contraction of the outer portion of the stem so as to induce splitting, or whether the coolness of the night causes it, is not certainly ascertained. Be this as it may, the result is the same—an imperceptible splitting of the straw through which the sap oozes out. The invisible and multitudinous seeds of the rust attach themselves to this sap, and burying themselves in it, rapidly vegetate, striking their roots in the openings of the straw, thus diverting to themselves the sap of the plant, which should go to the filling out and ripening of the grain. Hence it so rapidly shrivels, and often becomes worthless.

"What is the remedy against this evil? The Romans sacrificed a red bitch on the altar of the Goddess Rubigo, the priest entreating her to withhold her rusting hands. If the farmers could be persuaded to sacrifice all bitches to the goddess, then an altar ought to be erected to her on every farm, for the indirect benefit to the wheat crop by increased sheep husbandry would more than compensate all losses from the rust.

"The Jewish prophets regarded the blasting and mildew as a punishment for the sins of the people. When a people by rebellion, under such high condition of prosperity as exhibited by the census of 1860, seeks its own and the destruction of others, and the overthrow of the best government the world has seen, blasting and mildew of the wheat crop will not stay their impious hands. But, regarding the remedy for rust, through the microscope, we find that it is not in all stages of the growth of the plant that the straw is liable to split under heavy dews and a hot sun. It is not in its growing state, but in its ripening stage only, that this result is produced. Hence, whatever rapidly shortens the ripening stage lessens the danger. For this purpose there is nothing equal to stable manure, the precise effects of which on the soil and on the wheat crop will be stated under the head of manures. Another remedy is in immediate harvesting when the crop is affected by the rust. The following instructive experiments on this point I find in Mr. Klippart's essay on wheat. Mr. George D. Hendricks, of Preble county, Ohio, writes Mr. Klippart as follows:—'In 1842 I had a large field seriously affected by rust, and, having read in the *Genesee Farmer* the necessity of early cutting, I put a hand cradle to work and left; was absent a few days, and, on my return, found my hand had only cut a few dozen of sheaves, avowing that it was so green he knew it would be worthless. I then procured hands, and had the field cut, but too late for more than half a crop, whilst the portion cut at first was plump, and had well-filled grains.'"

New Cotton Fields.

The experiments in cotton cultivation in India, Sicily, and Algeria have succeeded beyond expectation. In Madras the export of only 105,033 lbs. in 1860 has increased to nearly 400,000 in 1863. In Hong Kong the export in a single month was 70,000 lbs.

In Italy the yield this year is estimated at $20,000,000 against $6,000,000 last season. Seventy thousand bales of 250 lbs. each were raised last year. The cultivation of cotton in the island of Sicily has become very general within the last two years; a source of wealth for the inhabitants of the district of Terra Nova. The crop of last year was about 6,000 bales. The cotton exhibition at Turin gave a wonderful impetus to cotton planting.

In France, on the lands of the Chateau of Avignon, the largest domain in Arles, cotton has perfectly succeeded.

At Cape Coast, Africa, the plantations were very flourishing, and a product of 30,000 bales expected.

In Algeria, within the last year, the increase in the land planted with cotton has been considerable.

Crossing the Atlantic, to South America, we find that in Paraguay there are about 7,000,000 of cotton plants, and the plantations at Corrientes are very extensive.

In Brazil cotton is extensively cultivated, and there are four million blacks who can be taught to cultivate it. Whatever progress may be made in its growth, and however the cultivation of it may be stimulated, the profit thereof will finally redound to the settled benefit of this country, for the increased supply and demand will call for an increased quantity of the better staple American, which will be the more required to mix with the poorer qualities of other

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regions; and as soon as the Southern markets are again opened, the former estimate of 4,000,000 bales yearly will, under the pressure of high prices that must rule for five years thereafter, be increased in that period to 6,000,000 bales.

THE SMITHSONIAN INSTITUTION.

We have received a copy of the Annual Report of the Board of Regents of the Smithsonian Institution, which was presented to Congress on the 19th of February, 1863. It seems that it takes the Government printers at Washington fourteen months to finish a book of 450 pages. "What is the fate of governments?" says Macaulay. "It is to buy the worst article at the highest price." Could not the Regents of the Smithsonian Institution induce Congress to place the money appropriated for this printing in their hands, so that the public might get these reports in three weeks instead of fourteen months? The following extract gives a brief and clear statement of the condition and aims of the Institution:—

"WILL OF SMITHSON.—The property is bequeathed to the United States of America, 'to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men.'

"The bequest is for the benefit of mankind. The Government of the United States is merely a trustee to carry out the design of the testator.

"The Institution is not a national establishment, as is frequently supposed, but the establishment of an individual, and is to bear and perpetuate his name.

"The objects of the Institution are, first, to increase, and second, to diffuse knowledge among men.

"These two objects should not be confounded with one another The first is to enlarge the existing stock of knowledge by the addition of new truths; and the second, to disseminate knowledge, thus increased, among them.

"The will makes no restriction in favor of any particular kind of knowledge; hence all branches are entitled to a share of attention.

"Knowledge can be increased by different methods of facilitating and promoting the discovery of new truths; and can be most extensively diffused among men by means of the press.

"To effect the greatest amount of good, the organization should be such as to enable the institution to produce results, in the way of increasing and diffusing knowledge, which cannot be produced either at all or so efficiently by the existing institutions in our country.

"To increase knowledge it is proposed to stimulate men of talent to make original researches by offering suitable rewards for memoirs containing new truths; and to appropriate annually a portion of the income for particular researches, under the direction of suitable persons.

"To diffuse knowledge it is proposed to publish a series of periodical reports on the progress of the different branches of knowledge; and to publish occasionally separate treatises on subjects of general interest."

The amount of the Smithsonian bequest received into the Treasury of the United States is	$515,169 00
Interest on the same to July 1, 1864 (devoted to the erection of the building)	242,129 00
Annual income from the bequest	30,910 14

Three Incidents of the Present Campaign.

A gentleman who has lately been at Fredericksburgh, tells the following incident, related to him there by a wounded staff officer:—The Sixty-second, New York, had been engaged and under fire all day in one of the recent battles, and General Getty gave orders to have them relieved and sent to the rear to rest. A sergeant, who heard the orders given, and happened to be near the General, touched his cap and said, "If it's all the same to you, General, we'd rather stay where we are."

A correspondent, in his account of Friday's battle, writes:—"Far down the plank-road, where Hancock fought, beyond the thickest rebel dead, lay a boy severely wounded, perhaps not less a soldier because but a boy. He had fallen the day before, when we were furthest advanced, and had remained unmolested within the rebel lines. They had not removed him, and he was alone with the dead when I rode up. The poor fellow was crawling about gathering violets. Faint with the loss of blood, unable to stand, he could not resist the tempting flowers, and he had already made a beautiful bouquet. Having caused a stretcher to be sent for, I saw him taken up tenderly and borne away, wearing a brave, sweet, touching smile."

A story is told of two men of the Twentieth Massachnsetts, which well illustrates the pluck of our soldiers and their indifference to danger. In the battle of the Wilderness, this regiment was in the thick of the fight, and one color-bearer after another was shot down almost as fast as the men could be replaced. But such was the eagerness to keep the flag aloft that at one time two men—Irishmen—caught hold of the standard at once, as it was about to fall, and struggled for it. Just then a shot struck the staff, cutting it in two, and leaving one man with the flag and the other with the broken stick. "Be-dad," said the man with the short end of the staff, "the rebels have decided for us, this time," and went to loading and firing again, as coolly as if nothing had happened.

CHASE'S COAL-SCUTTLE.

Great annoyance is frequently experienced from the dust which seems now-a-days to form a large part of every tun of coal. It is thrown in the fire with the large lumps, impedes the draft by filling up the small crevices, and is disagreeable in many ways. The

coal scuttle, or hod as it is called in some localities, illustrated herewith, is so designed that the difficulties alluded to are obviated entirely, and it is useful not only from this reason but from the fact that it will separate partly-burnt coal from the ashes mixed with it, so that the remaining refuse, clinkers, etc., can be quickly removed by hand. The body, A, of the hod is the same as ordinary ones, but in the bottom there is a sieve, B, which works on centers and has a handle, C, fastened to it so that it can be worked. Below this grate there is yet another bottom with openings, D, which can be closed by plates sliding underneath, said plates being worked by the handle, E. When the ashes and cinders are thrown in, by vibrating the handle, C, the dust falls to the first compartment, and when the other handle, E, is moved the ashes fall into any suitable receptacle over which the scuttle is placed, such as a barrel for instance. There are also two covers applied to the scuttle on top, which not only prevent dust from the coal being scattered about, but also put an effectual embargo on the use of the scuttle as a spittoon, receptacle for apple skins, cigar ends, or other unsightly rubbish which untidy people are prone to deposit therein. The lower part is of cast-iron which renders it very durable, bnt the top, F, is of sheet-iron and much lighter. This coal scuttle was patented on April 12, 1864, by Otis N. Chase, of Boston, Mass.; for further information address him at that place.

THERE is a tradesman in Chesunt, England, called O. Death; his next neighbors are Messrs. Want and Pain.

CHEAP MEALS FOR WORKMEN.

In the large manufacturing cities of England—Great Britain more properly—there are many institutions devoted wholly to the preparation and sale of cooked provisions to working-men. These dining rooms are not only highly advantageous to the men themselves, but if we may believe the reports published in English journals, are a source of pecuniary profit to those engaged in the enterprise. The London *Sanitary Reporter* thus speaks of a new building lately erected for this purpose:—

"A commodious building has been erected and opened in Cambridge street, for the provision of cheap meals to workmen. The building is spacious and more like a chapel than a dining-hall. It is built of red-pressed brick, and its entire cost, although it is a large building, is only £1,300. The large doorway and the two large windows in front have semi-circular heads, with brick margins, and keystones of granite. The hall is a quadrangle, 115 feet long by 34 feet wide. The ceiling is 24 feet hight and light is admitted through skylights in the roof, and through the windows at each side of the hall. There are forty tables, giving accommodation to 400 persons. The seats are backed but not cushioned, and the tables are covered with mahogany oil-cloth. The walls are papered with a dark paper for a hight of about five feet from the ground, and the remaining portion is covered with a lighter paper. There are a large mirror and a clock at one side of the room. The following is a copy of the bill of fare and prices:—Cup of coffee, 1d.; cup of tea, 1d.; cup of milk, ½d.; bread and butter, 1d.; bread and cheese, 1d; slice of bread, ½d.; boiled egg, 1d.; slice of broiled bacon, 2d.; ginger beer, 1d.—all of the best quality and always ready. Besides the above, from twelve to half-past two, may be had—bowl of soup, 1d.; plate of potatoes, 1d.; plate of hot roast beef, 3d.; plate of hot boiled beef, 3d.; plate of hashed mutton, 2d.; plate of hashed beef, 2d.; plate of cold beef, 2d.; plate of cold ham, 2d.; plate of plum pudding, 1d.; plate of rice pudding, 1d. Dinner (between the above hours) of soup, cold or hashed meat, potatoes, and pudding, 4½d. Breakfast (with the morning newspapers) ready at eight o'clock. The room is kept warm with stoves and gas, and is well ventilated. On the left-hand side there is a small room for women, with seats for between thirty and forty. This, it is expected, will be a very valuable part of the institution, whilst the whole establishment must prove a great boon to the mechanical classes."

These prices are incredibly small, and it is to be hoped that the quantity of food given is in an inverse ratio, else there would be but little advantage to the workmen. Similar schemes have been tried in this country but for some reason they were all dismal failures. One was opened in Dry Dock, corner of Tenth street and avenue D, over ten years since; another in New Canal street, and still others in different localities. Not one survives. Perhaps the conductors wanted to make too much money.

SPECIAL NOTICES.

BENJAMIN WELCH, of Salisbury, Conn., has petitioned for the extension of a patent granted to him on Sept. 3, 1850, for an improvement in surgeon's splints.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Aug. 15, 1864.

AUSTIN F. PARK, of Troy, N. Y., has petitioned for the extension of a patent granted to him on Aug. 27, 1850, for an improved electric telegraph manipulator.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Aug. 15, 1864.

RUSSELL SCARRITT, of St. Louis, Mo., has petitioned for the extension of a patent granted to him on Oct. 8, 1850, for an improvement in sofa bedsteads.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Sept. 19, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extensions are required to file their testimony in writing, at least twenty days before the final hearing.

A PROPELLER with twin screws, driven by an engine having friction gearing connected with it, was recently launched in Scotland.

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Correspondence

Concerning Drills and their Details.

MESSRS. EDITORS:—I have read with much interest the articles upon drills in the late numbers of your valuable journal (which I prize above all others); they bear the stamp of having been written by a sound practical man. They coincide exactly with my own experience, and I can easily conceive of their great usefulness. I have noticed in the modern lathes (in which the centers are fitted in a round tapering hole) that the common kind of chuck used to hold the drills is made with a shank turned to fit the center hole in the spindle. This I think a mistake, the chuck is costly to make, easily bent if iron, and broken if steel; it also necessitates the removal of the center, which is a great inconvenience if the lathe is used for turning and polishing.

I find the best, as well as cheapest way to make a chuck is to take a piece of round cast-iron, cut a screw-thread in the end to fit easily, screw on the spindle, and bore in beyond to make a chamber to contain (not fit) the center; leave enough iron outside of that to hold the drill, the hole for which should be drilled out on the lathe it fits; leave a thin partition between the drill hole and the center chamber, put in a set-screw to hold the drill, and the chuck is done, and will last a life-time; a slight tap on the side of the set screw will loosen it, and a pull on the belt will remove it entirely, leaving the center in its place, clean and untouched. On heavy chucks cast a square to apply a wrench for removal.

The best and cheapest drills for light drilling can be made by taking a bar of the best small square steel; draw out the drill in a forge and cut it off; not a grain is wasted; do not turn the shanks but put them into the chuck square, a five-sixteenths square steel will fit a seven-sixteenths round hole in the chuck. Should the steel be a trifle large, as it sometimes is, a little filing on the corners will fit it; polish on an emery wheel one of the squares and let the set-screw always bear on that side; when once true it is always true. The polished place is also convenient for marking. Don't throw the drill down for some one to spoil, when done with; if it fits a tap, or size of wire, mark it and lay it away, a few strokes will make another one when needed, let the drills accumulate even if by hundreds, it is all the better, and in a month the workman will bless the day he adopted this system.

GEO. E. FIFIELD.

Sagua la Grande, Cuba, May 5, 1864.

[Our correspondent gives very sensible and practical information, and this is the kind of letter that we are pleased to receive. Workmen cannot do each other more service, or their calling more credit, than by disseminating sound practical knowledge. Our columns are always open to them for this purpose.—EDS.

Suggestions concerning Steam Boilers.

MESSRS. EDITORS:—Your note on my letter inserted on page 342, current volume of the SCIENTIFIC AMERICAN, suggests an idea, viz., that if domes are inadmissible on men-of-war on account of their exposure to the shot of the enemy, would it not still be advisable to put them on and protect them by a shot-proof casing, say 6 to 12 inches clear of the dome all around? If domes would remedy the evil of taking the water from the boiler to the cylinder, and such is my experience, it is surely worth while trying to use them. That it is an evil there can be no question, if only in the extra consumption of fuel necessary to generate the larger quantity of water into steam that has to be fed into the boiler to take the place of what goes into the cylinders.

It is necessary for me to explain what I meant by a "solid pipe" in my last communication; it is simply, that in case of taking the "dry pipe" from the top of the dome through the boiler, it should not be perforated with a lot of small holes as I have seen them; these holes all draw in the water, and therefore destroy the utility of the dome.

ENGINEER.

New York, May 23, 1864.

Diptheria in Fowls.

MESSRS. EDITORS:—Attention has lately been directed to a new history of what may be called symptomatic diptheria. The facts were brought before the members of a scientific institute (Stadleman Institute) in Belvidere, N. J., and were, in brief, as follows:—A fowl, which had died of what is commonly known as "gaps," was examined and found to present, around the lips or edges of the larnyx, all the physical appearance of diptheritic disease. Under a well arranged Nachet microscope, the entire absence of organic structure and the color or refractive character of the exudation being the same, it was decided to institute a series of therapeutic experiments. These have, after several months, been conclusive in settling the following facts:—1. That which has been called by some "gaps" in fowls is a disease very similar to diptheria in the human species, even the "casts" disengaged being similar; 2. That the same treatment in the one case is efficient in the other. Chlorine has the same obliterating effect upon the poison which causes the deposition and exudation; 3. That in every instance where the chlorinated water has been used the fowl has commenced to recover in 24 hours, and finally recovered entirely, and this in the same coop with others which died in two or three days, without the treatment.

In addition to the facts it is suggested, on very probable grounds, that the disease may be conveyed to susceptible constitutions by the reprehensible practice of sending to market fowls which were killed before death had taken place, but only because the poulterers knew that death would certainly ensue.

Other experiments are in course of trial upon the eggs and broods of diseased fowls to test the probability of the existence of the virus in the eggs. We may add that the water administered was impregnated after the well known formula (2 drams of fluid to the pint, a teaspoonful every hour):—Potassæ chloras, 2 drams; acid hydro-chloric, 2 drams; and aquæ puræ, *a a* 2 ounces.

M

The above to neutralize the virus, used for about two days, after which, one grain sub-chloride of mercury, twice given, six hours apart (to hasten the absorption of the exudation), insures the perfect cure.

GEO. H. COURSEN, Secretary,

Belvidere, N. J., May 26, 1864.

NEW BOOKS AND PUBLICATIONS.

THE STEAM ENGINE INDICATOR. Stillman. Publisher, D. Van Nostrand, 192 Broadway, New York.

We lately received from the publisher a small neatly bound pamphlet with this title, and took it up with pleasure, hoping that it contained either some new ideas upon the subject of which it treated, or else old ideas in a new shape. To our disappointment we found neither, and we regret it the more since at this time there is a wide demand for a good work on the steam engine indicator. There is a growing desire among practical men to become better acquainted with this instrument, but all treatises upon it, so far, signally fail in clearly explaining its principle, operation, and management. The particular book here alluded to has some good points, but its faults are many. The style of indicator illustrated and described in it is of an obsolete kind, and the arrangement of the work itself is extremely faulty. The indicator is described in the first few pages, and the subject is then discontinued and some tables on the piston speed of steam engines interpolated. A few leaves further on the explanation of the indicator is resumed.

This little pamphlet has a very common fault with mechanical works—which is an assumption that the student or reader is already partially acquainted with the subject, and only desires to be better informed on some points; for instance, the author directs the reader to erect an ordinate, or to take the mean pressure on the piston, without telling him how to perform either of these simple processes, and the consequence is that the practical engineer, whose education has been limited, throws up the subject in despair and abandons it. Practical men want plain directions, and since this little work is lacking in this important feature we have felt obliged to give our views upon it. This treatise on the steam indicator was originally the advertising card of a large marine-engine works in this city, and we perceive that the publisher has taken a hint from these parties and not only issued their notices gratis, but supplied he reader with thirty pages of announcements of his new books, and as the entire book consists of only 120 pages, it strikes us as an infringement on the rights of the purchaser to devote so much of it to advertisements.

ATLANTIC MONTHLY. Ticknor & Fields. Boston, Mass.

The number of the *Atlantic* for June is one of the most readable issued in a long time. The writers' names alone are sufficiently attractive, for when an individual achieves a reputation for saying or writing good things, every one eagerly listens even if the utterance be common-place. Those persons who have a weakness for spiritual manifestations, of the kind generally known as "knockings," will read with intense interest, as we did, the article entitled "A Fast-day in Foxden," the author of which evinces a power of description and an appreciation of the ludicrous equaled only by Dickens in his earlier works. Donald G. Mitchell, Esq. (Ik Marvel), has an article upon Washington Irving; and Miss Prescott continues her romance, "The Rim." Mr. George Sala, the war correspondent of the *London Telegraph*, writes the criticism on Frederick Robson, an English actor, and Fitz Hugh Ludlow, Esq., contributes an excellent article, fresh and lively, on the great Yo-Semite Valley of California. Mrs. Stowe's "House and Home Papers" are capital reading and generally practical. The poetry is unusually good. The 14th volume commences in July. (For sale at all book-stores.)

THE MOTHER'S MAGAZINE AND FAMILY CIRCLE. Edited by Rev. D. Mead. Published monthly by Rev. D. Mead, 5 Beekman street, New York.

This periodical is in its thirty-second year. Its special object is to assist mothers in the early moral and religious culture of their children. Each number contains thirty-two pages of original and selected matter of a very interesting character. Price $1 per year in advance.

PHOTOGRAPHIC MANIPULATION.—This is the title of a modest little volume by S. R. Divine, a practical photographer of high repute, in which is given, in concise form, the complete details of the whole routine of practice usually adopted by the best photographic artists in the production of the finest pictures. The instructions here given are the results of many years' professional labor assisted by attentive study of each branch upon which observation is recorded. We have ourselves given some attention to practical photography and have frequently had occasion to test the accuracy and utility of Professor Divine's directions. We consider them almost infallible, and therefore have no hesitation in adding our commendation to the well deserved praise which this treatise has everywhere received. Seely, publisher, 244 Canal street, New York.

DESCRIPTIVE GEOMETRY, as applied to the Drawing of Fortification and Stereotomy. For the use of the Cadets of the United States Military Academy. By D. H. Mahan, LL.D., Professor of Fortification, Civil Engineering, etc., United States Military Academy. Published by John Wiley, 535 Broadway, New York. This is a thin volume of 55 pages, illustrated by plates, and will doubtless be found a reliable and convenient hand-book for all teachers of the subject treated of.

CLOCK AND WATCHMAKER'S MANUAL. Published by John Wiley, 56 Walker street, New York. This is a compilation from the French, translated by Mary L. Booth, translator of the "Marble-worker's Manual," etc. It is a book of 294 pages, illustrated by numerous plates. The translator says that she has taken as the basis of the work, M. Magnier's revised and enlarged edition of Le Normand and Janvier's *Manuel de l'Horloger*. The reputation of the translator is a sufficient guaranty that the work has been well done.

AN able physiologist has written that one-fifth of the human body is composed of phosphorus. *Punch* remarks that this most likely accounts for the number of *matches* made.

SOME idea of the value of the manufacture of small wares may be formed from the fact that one firm in Taunton, Mass. turns out yearly 1,500 tuns of tacks.

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MANUFACTURE OF PIANOS.

Few persons have an idea of the number of pianos annually made in this country or the amount of capital embarked in the business. From comparative insignificancy it has risen to the first importance, and at this time there are not many other branches of manufacture that afford employment to so many different persons, or that are so civilizing in their tendency as the one we have alluded to.

One of the largest factories in this city, that of the Messrs. Steinway, is occupied solely in the manufacture of pianos, and a recent visit to their establishment impressed us with the magnitude of their operations. A whole block, between 53d and 54th street, fronting the Fourth avenue, is occupied by three five-story buildings which are stocked from garret to cellar with workmen, tools, and materials. We cannot, in the short article to which our space limits us, give any adequate idea of the quality of the pianos made here, or of the energy and business tact which has built up the extensive trade which the Messrs. Steinway enjoy; it is solely the fruit of their own indomitable perseverance and talent. There are about 400 men constantly employed, who turn out about forty square and five grand pianos every week.

THE ENGINE.—A splendid engine of fifty-horse power is situated outside the building in the yard. It is used to drive all the machinery in the building. In the yard there are also located three steam boilers of fifty-horse power each, supplying steam for power, heating and drying purposes.

THE MACHINERY.—All the heavier portion of the machinery is located in the basement of the 53d street wing. In this room are three large planers, one of which was made expressly for this establishment by Ball & Williams, of Worcester, Mass., and is certainly one of the largest instruments of its class existing, planing the largest piano tops or bottoms at once. There are also four up-and-down saws, several circular saws, besides turning lathes, etc. These wonderful and powerful tools are constantly at work, shaping the rough plank ready for use in the first floor above, where the bottoms, blockings, wrest planks, and other parts of the case, are got up with the aid of molding, jointing, and other machinery. On the third floor is located all the finer machinery for scroll sawing, rounding corners, and shaping the various parts of mechanism. The floor above and the wing on 52d street are occupied by the case-makers, who take all these single parts made below, put them together, and veneer and finish the cases ready to go up to the top floor or varnishing room, where every case remains about three months to be thoroughly varnished. On each case-making floor there are three large warming boxes, constructed of sheet-iron. and covered with wood, with sufficient steam-pipes in them to raise the heat to 200 degrees. The varnishing department comprises the top floor, extending the whole length of the front and side buildings, a length of five hundred and thirty feet. From this floor the completely varnished cases are taken one floor lower down, in the front building, the sounding-board floor, where the sounding boards are fitted in. In the floor below the instruments are strung, the action and key-boards fitted in (which latter are manufactured on the corresponding floor of the 52d street wing) and the tops, legs, and lyres adjusted and put on. The partly-finished instruments are then taken first to the floor below, where the action is regulated, thence to the first floor, where the hammers and the tone are regulated, after which the final polish is put on the cases, and the perfect piano is ready to be sent down to the salesroom.

On this floor the store room is located, which contains the actions, felts, hardware, ivory, cloth, pins, wire, etc., etc., used in the interior works of pianos. Of these materials there is a vast supply always on hand, amounting in value to over $30,000. The front basement contains all the iron work, plates and frames, drilling machines, japanning works, and the rosewood veneers. Of the latter the stock on hand is rarely of less value than $12,000. No fire of any kind is used within the building. Every part of the factory is heated by means of steam-pipes, 40,000 feet of which line the interior.

THE GENERAL STOCK.—There are about 800 pianos constantly in course of construction, and these, in connection with the hardware, machinery, engine, veneers, lumber, etc., etc., represent at least the sum of $450,000, exclusive of the buildings. The cost of the building and ground is about $150,000.

The Big Trees of California.

The *Atlantic Monthly* for June, in an article entitled "Seven Weeks in the Great Yo-Semite," thus speaks of some immense trees in that region :—

"Take the dry statistics of the matter. Out of one hundred and thirty-two trees which have been measured, not one underruns twenty-eight feet in circumference; five range between thirty-two and thirty-six feet; fifty-eight between forty and fifty feet; thirty-four between fifty and sixty; fourteen between sixty and seventy; thirteen between seventy and eighty; two between eighty and ninety; two between ninety and one hundred; two are just one hundred; and one is one hundred and two. This last, before the storms truncated it, had a height of four hundred feet. I found a rough ladder laid against its trunk—for it is prostrate—and climbed upon its side by that and steps cut in the bark. I mounted the swell of the trunk to the butt and there made the measurement which ascertained its diameter as thirty-four feet,—its circumference one hundred and two feet *plus* fraction- Of course the thickness of its bark is various, but I cut off some of it to a foot in depth and there was evidently more below that.

"To make some rough attempt at a conception of what these figures amount to, suppose the tree fallen at the gable of an ordinary two-story house. You propose to cross by a plank laid from your roof to the upper side of the tree. That plank would perceptably slope *up* from your roof-peak. Through another tree, lying prostrate also, and hollow from end to end, our whole cavalcade charged at the full trot for a distance fo one hundred and fifty feet. The entire length of this tree before truncation had been about three hundred and fifty feet. In the hollow bases of trees still standing we easily sheltered ourselves and horses. We tried throwing to the top of some of them with ludicrous unsuccess, and finally came to the monarch of them all, a glorious monster not included in the above table of dimensions, as most of those mentioned are still living, and all have the bark upon them still, while *the* tree is to some extent barked and charred. When it stood erect in its live wrappings, it measured forty feet in diameter —over one hundred and twenty in circumference! Estimates, grounded on the well-known principle of yearly cortical increase, indisputably throw back the birth of these largest giants as far as 1200 B. C. Thus their tender saplings were running up just as the gates of Troy were tumbling down, and some of them had fulfilled the lifetime of the late Hartford Charter-Oak when Solomon called his master-masons to refreshment from the building of the Temple. We cannot realize time-images as we can those of space by a reference to dimensions within experience, so that the age of these marvellous trees still remains to me an incomprehensible fact, though with my mind's eye I continue to see how mountain-massy they look, and how dwarfed is the man who leans against them."

Relative Effect of Different Points upon Lightning-rods.

The *Comptes Rendus* publishes the following note which was addressed to the Academy of Sciences at Paris by M. Perrot :—

"By means of an electric machine, I charged a large metallic plate representing a cloud, until a very sensitive electrometer marked 10°. I then gradually approached to the plate, first a rod rounded at its extremity, such as M. Despretz has proposed as the terminal of a lightning-rod; afterwards an ordinary lightning-rod point, and finally a very sharp point. These experiments gave me as a mean, the following results :—

"1. The round-pointed rod remained without neutralizing effect until it was struck, at a distance which I shall assume as the units.

"2. The neutralizing action of the common point did not begin until the distance was less than 12 units.

"3. At the distance of 12 units, at which the common point had no neutralizing action, the sharp point discharged the plate instantaneously.

"4. The neutralizing action of the sharp point began to show itself when the distance was less than 170 units.

"The neutralizing of the fine point, therefore, extended nearly 170 times further than the striking distance, or 13 times further than the action of the common point."

Secret Writing.

Much has been said on the subject of secret writing, and many methods devised for conveying private or important messages in such a way that if they fall into improper hands their meaning will be safe from detection. Sympathetic ink is sometimes used, which is so made that the writing disappears in a short time, but again becomes visible on the application of heat, or some chemical preparation. But secrets thus sealed are readily unsealed by any chemist. The most common method is to construct a cipher, in which new and strange characters stand for letters or words, or one word stands for another, or the words to be read are mixed with other words, but placed in some determinate order. But few, if any of these are beyond the reach of an ingenious mind to interpret. And it is not so much guesswork as many people suppose. In unraveling a difficult cipher, numerous experiments have to be tried, but the operations are all based on comparison, and should be regular and systematic.

Poe, in his story of "The Gold Bug," gives some valuable hints on the interpretation of the most common cryptographs. He contends that the ingenuity of man can construct no enigma which the ingenuity of man cannot unravel. And he actually read several very difficult ciphers which were sent to him after the publication of "The Gold Bug."

But we saw, several years ago, a method which makes the message absolutely safe from detection. We will try to describe it:—Take a square sheet of paper of convenient size—say a foot square. Divide it by lines drawn at right angles into six hundred and seventy-six squares, twenty-six each way; in the upper horizontal row write the alphabet in its natural order, one letter in each square; in the second horizontal row write the alphabet, beginning with B. There will then be one square left at the end of this row; into this put A. Fill the third row by beginning with C. and writing A and B after Z at the end. So on until the whole sheet is filled. When completed, the table, if correct, will present this appearance :—in the upper horizontal row, the alphabet in its natural order from left to right; in the left hand vertical row, the same from top to bottom; and the diagonal, from upper right to lower left hand corner, will be a line of Z's.

Each party must have one of these tables. A key-word must also be agreed upon, which may be any word in the English language, or from any other language if it can be represented by English letters, which key-word spells nothing.

Now, to send a message, first write the message in plain English. Over it write the key-word, letter over letter, repeating it as many times as it is necessary to cover the message. Take a simple case as an illustration. Suppose the key-word to be *Grant*, and the message *We have five days' provisions.* It should be placed thus:—

G r a n t g r a n t g r a n t g r a n t g r a n t
W e h a v e f i v e d a y s p r o v i s i o n s.

Now find, in the upper horrizontal row of the table, the first letter of the key-word, G, and in the left hand vertical column, the first letter of the message W. Run a line straight down from G, and one to the right from W, and in the angle where the two lines meet will be found the letter which must be written as the first letter of the cipher. With the second letter of the key-word, R, and the second letter of the message, E, find in the same way the second letter of the cipher.

The correspondent who receives the cipher goes to work to translate it thus :—He first writes over it the key-word, letter over letter, repeating it as often as necessary. Then finding in the upper row of his table the first letter of the key-word, he passes his pencil directly down until he comes to the first letter of the cipher; the letter opposite to it in the left hand vertical column is the first letter of the translation. Each of the succeeding letters is found in a similar way.—*Exchange.*

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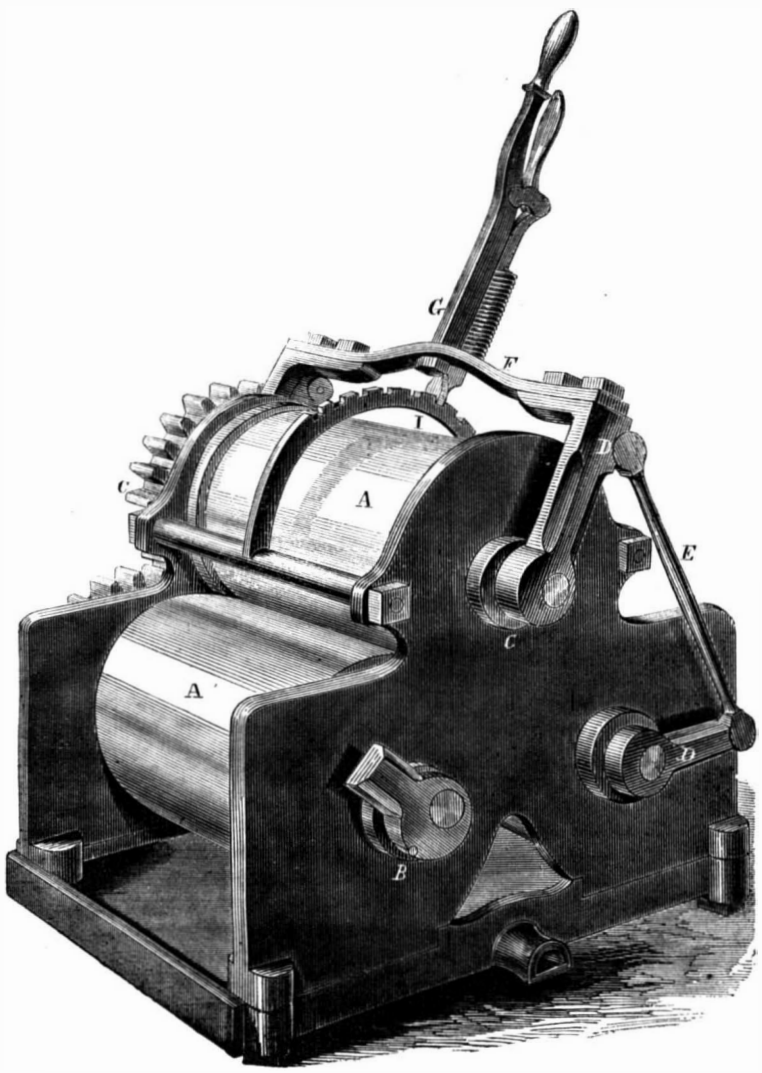
Improved Sorghum Mill.

The success which has attended the introduction of the sorghum or Chinese sugar cane in the Western and Northern States, and the increased importance which it has assumed since the breaking-out of the rebellion, in consequence of the greatly enhanced price of the Southern sugar and molasses, has awakened a strong interest in its cultivation and manufacture.

The engravings published herewith represent a sugar-cane mill adapted to the use of persons not accustomed to adjusting machinery. Its peculiarity consists in the manner of supporting and adjusting the rolls in eccentric bearings, by which they are parted or closed up with the utmost facility even while running. The mill as here shown is horizontal, consisting of three rollers, A, supported by vertical frames which rest upon an appropriate base or juice pan. The rolls are all connected in the usual manner by gear wheels placed upon the outer extremities of the roll shafts, and motion is imparted to the rolls by any suitable power.

This mill is provided with perfectly circular bearing boxes, as at C, which are fitted to circular openings or spaces in the frames. These circular boxes receive the journals of the roll shafts in openings or seats, which are eccentric to the outer circumference, and upon two of the boxes at each end of the mill there are arms, D, which are connected by a rod, E, with knuckle joints; the two top eccentrics are united by a transverse bar, F, spanning the mill above the master roll, connecting the pair of arms at one end of the mill into the corresponding pair at the other end. Firmly secured to the transverse bar is an upright lever, G, which carries a stop, the lower end of which enters the notches in the toothed sector, I, retaining the lever and arms in any position in which they are placed. By shifting the lever the radial arms attached to the boxes cause the boxes to ve around in their seats, whereby the front and top roll are made to approach each other; the proximity of the top roll to the discharge roll is also increased in a precise and desired ratio. The ends of the rolls being both acted upon by the same force will of course be caused to move alike, and the surfaces of the rolls will be constantly parallel to each other.

These mills are made of different dimensions, both horizontal and vertical, and arranged to be operated by either steam, water or animal power and of all capacities. After a test of three years they have been found exceedingly satisfactory. Any further information may be obtained by addressing the inventor, S. L. Denney, Christiana, Lancaster county, Pa.



DENNEY'S SORGHUM MILL.

Rebel Asphixiated Balls.

A correspondent of the New York *World* says that if Gen. Grant gets to Richmond the rebels will do terrible things to him. He thus describes what is in store for us:—

"I must mention a new and novel invention by Capt. Holden, of the rebel army. It is nothing more nor less than a stink-ball, and is designed to be fired into the works of besiegers to stink them out. About the middle of April, I was one of several civilians who, upon invitation, accompanied a party of officers to Atlee's station, on the Central railroad, ten miles from Richmond, to witness some experiments with this ball. The ball is an iron shell containing combustible and destructive materials, as well as odoriferous matter, and in appearance is similar to the stink-ball in use many years ago. It is designed to be thrown by mortars, but in the test on the occasion referred to, the fuse was lighted and the shell allowed to fulminate where they were placed. The stench which followed the explosion was the most fetid and villainous that ever outraged the olfactories of man—it provokes sneezing and coughing, and produces nausea, rendering it impossible for men to do duty within reach of it. A single ball will impregnate the atmosphere for fifty yards around, and the fetid compound, entering everything it touches, emits the stench for a long time. The opinion of all who witnessed the experiment was that these balls were a fair offset to Greek fire, and Gen. Winder, and several other officers of rank who were present, expressed the belief that it would prove more effective for driving off besiegers than anything ever invented. Be this as it may, if Richmond is ever threatened by a siege, the "sneezers," as the inventor facetiously calls his balls, will form a prominent feature in the defensive operations."

Chipman's Railway Washing Machine.

A great many washing machines, ingeniously constructed, have been offered to the public of late years,

and the number of them is constantly increasing. Different persons will, of course, have predilections in favor of particular machines. For family use the simplicity of this machine will commend it to all, while the ease with which it is operated is also of great additional value; for if it is as hard work to wash with a machine as without it, there is certainly not much advantage in using one. This machine is very gentle in its treatment of the clothes placed in it, and notwithstanding the mechanical appearance of the wheel, seen in the broken-out portion, its action is thorough and efficient.

The construction and operation of the machine is as follows:—The box or case, A, has rockers, B, strongly fastened to it, which set on the ways, C. Inside of this case there is a flutter wheel, D, which has several leaves, or buckets, grooved like a wash-board. The axle of this wheel is carried in a V-shaped bracket, shown at E, which works in the guides, F. There is a small rod on the bracket which has a spring on it, as shown at G, so as to keep the wheel down. The operation of the machine is as follows:—When the clothes are inserted through the door, H, they fall down immediately in front of the wheel. The box is partly filled with hot water and suds, and being rocked back and forth on the ways causes the wheel to revolve on its axle, and draw the clothes under, squeezing them as they pass. This action goes on continually, and with each vibration of the machine, the clothes are drawn under the wheel and squeezed in passing. The springs allow the wheel to rise over unequal portions, and also serve to press the garments every few moments. The corners of this wheel are rounded-off smooth, and there are no projections inside, or any iron work to come in contact with the clothes, and tear or rust them. There is also a small line, I, attached to the frame and the machine, so that when the feet set on uneven ground the line will prevent the case from working down to one end. The machine may be operated from the side by the handle, J, or from the end, as shown in the engraving.

A churn has been constructed on this principle, with some variation as to detail, and we are assured by the inventor that it is an invaluable one. The best proof of its utility is the fact that he is now introducing them to a large number of the Orange county milk firms in this city. They will churn half a barrel of cream in a short time and gather the butter.

It was patented October 13, 1863, through the Scientific American Patent Agency, by Edgar Chipman. For further information address the manufacturers, E. Chipman & Co., 498 Broadway, New York.

Fancy Boiler-making.

We lately examined a large boiler in one of the English blockade runners. It was built, apparently, to carry very low steam—the lower the better according to our opinion. It was square and had horizontal tubes, but the absence of braces was a most remarkable feature. The water bottoms under the furnaces had not a stay-bolt under them, neither had the water spaces or legs; but above the furnaces there were some ponderous bolts—shafts we might say—about 1½ or 2 inches thick, running across the boiler about two feet apart, and similar braces up and down, from the water bottom to the top of the shell. There was not a single brace on the arches, nor yet between them, and the consequence of omitting them was plainly shown in the bulging and distorted sides. A curious piece of deception was practiced by the maker of the boiler putting in *sham socket bolt-heads*, a thing we never saw done before. The outside shell was studded as thick with bolt-heads as a patent safe is with knobs, but on looking inside the space there was nothing but rivet heads. This may be termed fancy boiler-making. It was built in Paisley, Scotland.

THE diameter of the sun is equal to more than three times the distance from the earth to the moon.

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VOL. X. NO. 24....[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, JUNE 11, 1864.

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TO OUR READERS.

The present volume of the SCIENTIFIC AMERICAN, being the tenth of the new series, closes on the 25th of June, and we would remind all those whose subscriptions expire at that time, of the importance of promptly renewing them in order that they may not lose any of the numbers by delay. Our subscription list is now larger than at any period since the breaking-out of the war, and this in the face of the fact that many of our regular readers are now in the service of the country. To continue the interest in our journal we have spared neither time, exertion nor labor, and we think we may point to the three last volumes in support of the truth of this assertion.

The personal experience of the editors, and the frequent suggestion of useful ideas by correspondents, makes the SCIENTIFIC AMERICAN unequaled as a source of practical mechanical information. In its peculiar province this journal stands alone, and aims to be a faithful record of the genius, inventive talent and energy of the age we live in. From time to time we have published illustrated articles on tools and workshop economy, which have been most favorably received, and it is our intention to continue this subject in the ensuing volume. There is no other journal in the country which gives such full and specific information upon the enginery of war (frequently illustrated by diagrams received from official sources) as the SCIENTIFIC AMERICAN; in this respect the non-professional or general reader will find it of great interest. We need not enumerate special features, however, to convince our friends that we are working for their benefit, and endeavor to not only fulfill our contract, but to give good measure, heaped up and running over. We hope that all those whose subscriptions expire with this volume will not only renew them promptly but induce others to be subscribers also.

VALUABLE EXPERIMENTS IN WORKING STEAM.

Mr. George Hecker, of this city, has already expended some $6,000 of his private funds in experiments designed to ascertain the practical value of working steam expansively. Those experiments were made about four years ago, and an account of them was published in the SCIENTIFIC AMERICAN at the time. An engine for the purpose was designed and constructed by Henry Waterman, 239 Cherry street, and the experiments were made at his place. Though the engine was immersed in steam of the boiler temperature, only about one-sixth portion of the theoretical value of expansion was realized, a result very surprising to the experimenters, and which led to much reflection in regard to the cause. Mr. Waterman came to the conclusion that if the condensation and re-evaporation of steam within the cylinder could be prevented, a larger portion of the value of expansion would be obtained, and he designed an engine to settle the point. Mr. Hecker,on considering the matter, determined to defray also the expense of this second series of experiments.

Mr. Waterman's plan was to make the cylinder with very thin walls so that the heat would be quickly transmitted from the outside to the interior. He accordingly made his cylinder of steel plate, $\frac{1}{10}$th of an inch in thickness, and surrounded this with a similar plate; the space between being $\frac{3}{8}$ths of an inch thick, and the two cylinders being stayed together by numerous screws passing through the walls of both. This double cylinder is then enclosed in an ordinary cast-iron cylinder where it is secured by red-lead cement.

An experimental engine was constructed on this plan with a cylinder 10 inches in diameter and 2 feet stroke. The resistance is furnished by a large fan with 4 radial arms 6 feet long, each carrying a sail 3 feet $1\frac{1}{2}$ inches by 11 feet $1\frac{5}{8}$ inches; revolving about 68 revolutions per minute.

The experiments are now being conducted at Mr. Waterman's shop. They are made in series of thirty hours each; competent men being constantly employed to watch the engine, and to make a record each hour of the following facts:—

Whole number of strokes of the engine,
Pressure of steam in boiler,
Temperature in the room,
Temperature in the feed tank,
Temperature in the hot well,
Temperature of injection water,
Vacuum in condenser,
Hight of barometer.

The time required to evaporate each tank-full of water, weighing 450 lbs., the time required to consume 350 lbs. of coal, and all other material facts are also recorded.

We shall watch these experiments with great interest and shall publish a full account of them with the results.

SCRAP-IRON FORGINGS.

We once asked a blacksmith, of great experience in his trade, his opinion of making fine forgings for first-class work out of scrap-iron; whether merely accumulating shreds of iron and fagotting them up indiscriminately would produce a superfine piece of material at the completion of the job. The answer was laconic and unequivocal; said he—"Good scrap-iron will make good material, and poor iron will always be poor iron." This is precisely our own opinion in most respects. Skillful manipulation and successive heats may indeed make inferior iron a little better than it was, but the idea that superior forgings can be made out of refuse scrap, or bits of poor iron, is an erroneous one, palpably so to those who will take the trouble to think for a moment. In establishments where only the best iron is used, such as the Ulster, Lake Superior, or Salisbury brands, the scraps will of course be of the first quality; but as for the miscellaneous combination of every conceivable sort of cuttings that are sometimes "piled" in blacksmith-shops—such as curry-comb backs, old iron skates, kitchen pokers, bitts, auger-shanks, or ordinary rolled iron—making good iron, it is unreasonable to suppose it.

"But," says the practical reader, who possibly objects to this view, "no matter if the quality of the iron is inferior at first, you have admitted that successive heatings and workings will improve it so much that at length it becomes of an excellent quality." Our answer to this is that the experiments of Mr. William Clay, an Englishman, who has made the subject a study, prove that, up to a certain point, working iron over and over is advantageous; but after the maximum is reached the strength decreases in the same ratio that it rose. In twelve experiments with ordinary No. 1 iron (whose original tensile strength was 43,904 pounds), through six trials the strength was increased to 61,824 pounds, but upon continuing the working of the same iron up to the twelfth experiment, the quality deteriorated to the original figures, 43,904 pounds.

From these experiments it is easy to see that iron highly refined, and particularly scrap-iron which may have been worked and re-worked an infinite number of times before it was piled, is the very worst material that can be used for forgings that require great strength, homogeneity, and tenacity. For another reason scrap-iron is bad for large forgings, and that one is the different welding points at which different qualities of iron unite. Iron manufacturers are well aware of this peculiarity, and in piling iron for rolling, the hardest and most refined metal is placed outside, and the softest, or what is known as puddled iron, in the center of the mass. Were it not for this precaution the exterior would be burned before the center was fully heated.

Gun barrels, known as the stub-and-twist, or Damascus pattern, are made from scrap-iron and steel, but of the best quality, and they are more valuable from their peculiar appearance than from any special value in the selection of the material or the manner of their construction. The "regulation rifle," made at Springfield, is rolled from pure soft iron, and is one of the strongest weapons of its kind in the world. There are very many places where scrap-iron forgings can be used with economy and to great advantage; in fact there is no other way of utilizing the continual waste of the smithery; but where a uniform and even wearing surface is required, scrap-iron is the worst that can be used. The practical workman knows that in turning a scrap-iron shaft there are many degrees of difference in the hardness of certain portions, and we can call to mind several instances where pieces of hard steel have been cut out of journals and replaced with soft iron. Many engine shafts pound in their bearings in spite of all the efforts of the engineer to prevent it, by lining up or screwing down, and very often the trouble can be remedied only by turning the journal anew. Some portions of it were softer than others, and wearing faster, caused the shaft to become oval, so that the more the "binder" was brought down the worse it behaved. Links for working valves, in fact all parts that require homogeneity, either for bearing surfaces or mere finish, should be made from iron of one kind, if it is desired to obtain the best results.

PATENT LAW DISCUSSION.

We have been devoting considerable space in the SCIENTIFIC AMERICAN to the publication of the views of the Commissioner of Patents, in relation to the expediency and justice of the general system of granting patents for new inventions, in which the whole subject is discussed in an able and comprehensive manner. It must be conceded by all unprejudiced minds that the Commissioner has effectually met the flimsy arguments that have been put forth in England by the opponents of the patent system.

We notice also with pleasure that Thomas Webster, Esq., an eminent patent-law barrister of London, has recently published an able treatise on the subject, in which the same views are substantially affirmed. We regard this discussion as timely and important, inasmuch as there exists a comparatively insignificant class in all countries who, though unable themselves to originate inventions, are nevertheless anxious to profit by the ingenuity of those who have brains to work out new improvements. The unanimity of sentiment on the subject in this country is remarkable. While on religious, political, and all other questions, there is an unexampled manifestation of that diversity of opinion which has always characterized free communities, from the days of ancient Athens, there are two elements in our institutions which meet with unanimous approval; these

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are our common-school system and our patent laws. We are all satisfied that to these two systems, more than to all other circumstances, is to be attributed the unparalleled progress of this nation in material prosperity.

In the large way, and as applied to nations, fertility of intellect is in very close proportion to education and culture. Where the mechanics of a country have a good common school education, as is generally the case in this country, they will not only use the tools and machinery which they possess with intelligence and skill, but they will be frequently thinking of some improvement in the modes or the mechanism that they are using. In the absence of patent laws most of these suggestions would never be tried. There is generally a course of costly experiment to be gone through in order to make any new improvement practicable, and men of means are not usually disposed to incur such outlay for the public benefit without some prospect of personal compensation. The Secretary of the Treasury stated in an official report that the cost of perfecting the nail-cutting machine was more than a million of dollars.

The compensation for such experiments is furnished in the most just, proper, and perfect method, by giving the inventor a monopoly of his improvement for a limited period. The patent laws have less effect in stimulating invention than in bringing into use the inventions that are made. It is in this way mainly that they have contributed to that rapid improvement in all of the industrial arts which characterizes the century in which we live. This improvement has multiplied many fold the power of the nation to produce wealth, and is the principal cause of our manufacturing and commercial prosperity.

Nothing is more marked and certain than the constantly-increasing respect for the patent system and for patent property. The courts are constantly more and more disposed to protect patent rights, and capitalists are becoming constantly more and more ready to furnish money for the development of new inventions. The system, from small beginnings, has spread its thousand-fold ramifications into all the operations of life, and the conviction of its beneficent operation and usefulness has grown with its growth and strengthened with its strength.

At one time the invidious comparisons that were made of the small number of patents taken out in the Southern States caused some opposition to the patent laws at the South. But the small extent of this opposition even there was shown by the very prompt adoption of a patent system by the so-called Government of the Confederate States, and this has proved the only prosperous department of their rickety concern.

There can be little doubt that the discussion now in progress in England will result in a firmer establishment of the patent system. Even though the London *Times* and some of the lesser lights have endeavored to make the people believe that protection to inventions, as now practiced, is a clog and hindrance rather than an incentive to progress and growth in the mechanical arts. In this country the matter is generally regarded as fully settled. We should as soon think of giving up the Christian religion or the common schools, as the patent laws.

TRIAL TRIP OF THE "SACRAMENTO."

After a two days' run to Newport, R. I., and back, the new steamer *Sacramento* returned to her dock foot of Canal street, this city, at 12 o'clock on Wednesday, June 1st. The occasion of the excursion was the engineer's trial trip; and with about forty other invited guests, we were among the number on board.

The *Sacramento* is a first-class side wheel steamer, 300 feet long, 43 feet breadth of beam, and 28 feet depth of hold, and was built for the Pacific Mail Steamship Company, by W. H. Webb, Esq., at a cost completed of about $650,000. Her capacity is 2,678 tons, Custom House measurement, and she is capable of carrying from 1,200 to 1,500 passengers. The engine is an upright single beam, 100-inch cylinder, and 12 feet stroke; and although this was the first time the vessel had been to sea, the engine was not stopped for any repairs or for tightening journal-boxes from the time she left her dock on Monday afternoon till her return on Wednesday. For a new engine of such large dimensions the ease and constancy of the action were highly satisfactory. The engine was built at the Novelty Works, this city, and its finish and workmanship are of the highest order.

The most ample provision is made to guard against fire on board; for a passenger vessel this is a most important feature, and one which every person that has been to sea and suffered from apprehension of fire, will appreciate. The ship is provided with 26 separate hose, coupled to pipes at various points, which pipes run entirely over the vessel, and the water is taken from the exhaustless ocean and forced through these pipes by means of three donkey engines, whose capacity we were informed by engineer Vanderbilt, is sufficient to force as much water through the pipes as seven of our first-class steam fire engines; and as these pipes extend throughout the vessel, and every sailor on board is assigned to some special duty in which all are drilled, thus forming a most efficient fire-brigade, it seems as if it would be almost impossible for a fire to get under much head-way before it could be extinguished. The ventilation of the ship is very complete; and she is provided with six large Francis's life-boats, capable of carrying 150 persons each, and four smaller ones, capable of carrying 50 or 60 passengers; and all of these boats are constantly provided with cans of provisions and casks of water.

The Normandy apparatus for rendering salt water fresh and at the same time aërating it—was a subject of much interest to the guests on board the *Sacramento*. The apparatus (which was in operation), has the capacity of producing 2,000 gallons of pure fresh water per day, impregnated with atmospheric air; thus rendering it as sparkling and palatable as if coming fresh from a mountain spring. In the saving of space, formerly so much occupied on shipboard by water-tanks and barrels, which can now be devoted to freight, we should suppose the apparatus of Dr. Normandy to be almost indispensable. This apparatus was illustrated and described on page 257, Vol. II. (1860), of the SCIENTIFIC AMERICAN.

The *Sacramento* sails for the Pacific coast in about ten days, where she is to ply between Panama and San Francisco, in the Pacific Mail Steamship Company's service. If any rebel privateer attempts to take the vessel as a prize, we concluded from what we saw on board that they might feel sorry they had undertaken the enterprise. She has on board, in position for use, four 20-pound Parrott guns, and one 100-pound gun of the same inventor, with abundance of ammunition and solid shot to match the ordnance.

The *Sacramento* is commanded by Capt. George H. Bradbury; First Officer, Mr. Nolen; and Chief Engineer, Daniel Brolley.

To Mr. W. W. Vanderbilt, Engineer-in-chief of the construction department of the Pacific Mail Steamship Company, we were under special obligation for a lucid explanation of the construction and operation of the mechanical department of the vessel. To the officers of the Pacific Mail Steamship Company (from whom the cards of invitation emanated), and to the officers and attachees of the ship, all the guests were indebted for a delightful two days' excursion.

THE NUMBERS OF PATENTS.—The constitution of the United States went into operation on the 4th of March, 1789, and the first patent law was approved by Washington on the 10th of April, 1790. The patents issued previous to the passage of the law of 1836 were not numbered, but the first patent issued under that law bore date July 28, 1836, and was numbered "one." Since that time the patents have been numbered in succession, reaching now the number of 42,998.

DOMESTIC WINES.—The medical purveyor of New York has, upon special request, furnished many of our army surgeons with the native wine and brandy, and they have reported on them so favorably that it would seem only necessary to make known to all the fact that we have of our own production, a cheap and perfect substitute for two such valuable and costly articles.

THE Newburyport *Herald* says that within four and a half years the James Steam Cotton Mill has earned double its capital. It has actually divided $377,500 on a capital of $250,000, besides making heavy reserves.

GEN. SHERMAN'S ENGINEER.—The correspondent of the Cincinnati *Commercial*, writing from Sherman's army says:—"I have not heard whether the rebels burned the railroad bridge over the Etowah or not. But I do know that every timber needed to replace it has been made, and is now ready to find its fellow In fact, the measurement of every bridge from Dalton to Atlanta has been obtained by Col. W. W. Wright, and duplicates constructed ready to be erected instantly."

AT the last meeting of the Philadelphia Horticultural Society, Mr. Charles V. Hagner exhibited mushrooms raised in the cellar of his residence. Some of them weighed a pound and an ounce. The cellar contains three beds, averaging from five to sixteen feet.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MAY 31, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

42,921.—Thrashing Machine.—Peleg Barker, Battle Creek, Mich.:

I claim, first, The hinge shore, D, or its equivalent, for raising the machine, for the purpose of discharging grain, &c., into bags or returning unthrashed heads of grain, etc., by means of vibrating spout, C, without the use of elevators, as herein specified.

Second, I claim the eccentric shakers, A A A, for the purpose of more thoroughly separating the unthrashed heads of grain, etc., from the straw, as herein set forth.

Third, I claim the angular beaters, B B B, they being adjusted by reversed angles around shaft, 6, for the purpose herein described.

42,922.—Photographic Album.—John W. Beackley, Philadelphia, Pa.:

I claim the supplement cards, arranged to draw from or hinge to, photographic album leaves, as specified.

I also claim the manner of securing and sliding the card frame, h, on the middle bar, c, in the manner shown.

42,923.—Fruit Basket.—L. W. Beecher, New Haven, Conn.:

I claim constructing the bottom of baskets with a ledge, as described, for the purpose specified.

Also constructing the side of baskets from a single piece of material, substantially as described.

42,924.—Window and Door Fastener.—L. C. Bignall, Lockport, N. Y.:

I claim the combination of the handle, A, provided with the wedging end, b, and the several blades, B B′ B″, of graduated length, arranged and operating substantially as and for the purpose herein set forth.

In combination with the wedge handle, A, and graduated blades, B B′ B″, one of which is provided with the nib, c, I also claim the holes, k, and stop pin, l, substantially as and for the purpose herein specified.

42,925.—Cement for Roofing.—Stephen Borverman, Battle Creek, Mich.:

I claim a compound cement for roofing purposes, prepared and applied substantially in the manner and for the purpose set forth.

42,926.—Brick and Drainage Pipe.—Isaac C. Bryant, Philadelphia, Pa.:

I claim, first, The placing of a permanent screw, G, with double or single thread and revolving cylinder or chamber, J, with a short or longscrew, L, in it, withright or left-hand screw in either the revolving chamber or permanent screw.

Second, Giving to the revolving screw, L, and permanent screw, G, the tapering form.

Third, The peculiar form of the tempering teeth, D, and mouth-piece, C, so as, after tempering the clay they will force it close to and into the permanent screw, G, and revolving cylinder, J.

Fourth, The application of the two screws, G and L, the inside one permanent and the outside one revolving in combination with the tempering teeth, D, with the case, F, around the tempering teeth, D, and forming the tempering chamber with the roller, B, in an opening of the outside case, F, so as to force the clay against the mouth-piece, C, and into the screws, L.

Fifth, The combination of the knife, V, with a revolving handle and spiral or other springs to give it a spring and elastic lateral motion so as to cut off drainage or other pipe and bricks at right angles with the pipe or bricks, as described.

Sixth, The mouth-piece, T, with one or more openings in it, and a guide, U, on it for the purpose of guiding the knife for cutting off drainage or pipe and bricks, as described.

Seventh, The combination of a round mouth-piece with a forming mandrel inside of it and so placed in the end of the screw as to form the inside of drainage or other pipe as described,

42,927.—Feed Rack and Trough combined.—Daniel Close, Harmonsburgh, Pa.:

I claim the construction of the double feed trough, c c c c, with the bars, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, to keep the cattle from crowding, in combination with the rack, 12, 13, and covers, B B, constructed as described, when the same are in the aforesaid combination, for the purposes set forth.

42,928.—Lantern.—James A. Cowles, Chicago, Ill.:

I claim, first, The use and employment of tubes in the perforated diaphragm, N, substantially as and for the purpose described.

Second, The combination of the small tubular holes, s s, with the side passages, O O.

Third, The use and employment of tubes in the perforated diaphragm, H, substantially as and for the purpose described.

Fourth, The tubes in diaphragm, H and N, in combination with a metallic cap or mounting, glass globe and metallic base, substantially as and for the purpose described.

Fifth, The side openings, P, when two or more are used, provided with slides, V, to regulate the draft, in combination with the diaphragm, H, and tubes, t t.

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42,929.—Blind and Shutter-fastener.—William Crighton, Fall River, Mass.:

I claim the combination of the two similarly-formed plates, C C', with apertures, d e, the pins, b' f and g', and the socket, a b c, all constructed, arranged and operating in the manner and for the purposes herein specified.

[This invention consists in the employment or use of two plates fitted on a pin in a socket which is inserted in the lower edge of a blind or shutter, and arranged in such a manner that the blind or shutter will become fastened when thrown open or when closed, and the fastening when the blind or shutter is closed not admitting of being unfastened from the outer side of the latter, but from the inner side only, yet admitting of being unfastened when the blind or shutter is secured in an open state.]

42,930.—Harvester.—Geo. S. & Henry Curtis, Chicago, Ill.:

I claim the elastic rings, C C, the eye, B, washers, D D, and the eye-bolt, E, combined with a sickle bar, A, of a reaping or mowing machine, substantially as and for the purpose herein set forth.

42,931.—Glass Button.—A. W. Demuth, New York City:

I claim the process of making glass buttons or other articles of glass, as herein described and for the purpose specified.

42,932.—Cultivator.—A. P. Durant, Atlanta, Ill.:

I claim the two share frames, E E', when constructed, combined and arranged in respect to each other and the axletree, A, as described, and when raised and lowered by the forward and backward motion of the draught power applied to the double-tree, R, substantially as shown and described.

43,933.—Artificial Teeth.—S. D. Engle, Hazleton, Pa.:

I claim the metal stays or hooks, c c, soldered to the metallic plate in combination with the pins, a, of the teeth and with the vulcanite, for securing the teeth to the plate, all as herein specified.

[This invention relates to dentures in which the teeth are secured to a metallic plate by means of vulcanite, and it consists in the employment of metal stays or hooks soldered to the metallic plate but not to the teeth, the principal objects being to obviate the warping of the plate, to reduce the work of fitting the teeth thereto, and to form a better hold for the vulcanite, and thereby enable the teeth to be more firmly secured thereto.]

42,934.—Pepper-box Top.—James S. Ewbank, New York City:

I claim, first, The combination of a perforated diaphragm with the cap of a pepper or spice box, substantially in the manner and for the purpose set forth.

Second, The formation of a chamber in the cap of the pepper or spice box to receive and retain weights to produce vibrations therein, substantially as and for the purpose set forth.

42,935.—Cooking Stove.—Sabastian Fares and Wm. Miller, Cincinnati, Ohio:

We claim the combination of the box door, C D, with a register, E F, at top thereof, and partition, d, the latter being set at some distance from the back of the door or front of the grate, and all being constructed and arranged as described.

42,936.—Coffin.—Lucian Fay, Cincinnati, Ohio:

I claim, first, The provision of the wooden frame, C, extending around the body of a sheet metal burial case to give it strength and stiffness and to afford a place of attachment for the lining.

Second, The arrangement of the wooden frame or lining strip, C c, and reflexed metallic rim, B b, substantially as set forth.

Third, The metallic screw rockets, D, traversing the metallic rim, B, and wooden frame, C, and secured substantially as and for the objects set forth.

42,937.—Preventing Interfering in Horses.—E. M. Gardner, Nantucket, Mass.:

I claim the said guard as made with the lip, a, and the part, b, formed and arranged substantially in manner and for the purpose of being applied to the foot of a horse as specified.

I also claim the arrangement of the guard, C, or its lip, a, and part, b, with respect to the hoof, shoe, and the shoe nails of a horse, substantially in manner as specified.

42,938.—Submarine Port-hole.—T. F. Gilliland, Chicago, Ill.:

I claim, first, In combination with a submerged port-hole, a removable shutter to close the outer orifice of the same, when constructed with a central plate, to be shattered by the passing shot, and an elastic backing, substantially as described and for the purpose set forth.

Second, In combination with a removable shutter to close the outer orifice of a submerged port-hole, I claim a channel way, K, through which the said shutter may be passed to its place, from above the water line, substantially as described.

Third, In combination with the removable shutter which closes the outer orifice of a submerged port-hole; the clamping rod, F, the hooks, G, rod, H, hooks, c, and rods, J, being parts necessary to the proper management and security of the shutter, C, constructed and operated substantially as described.

42,939.—Churn.—Charles R. Gorgas, Wooster, Ohio:

First, In combination with the cylindrical churn, A, I claim the three bars, G, the latter being adapted to revolve with the former, arranged in parallel and equidistant positions and locate i about one inch from the inner surface of the churn, A, so as to operate in the manner as set forth.

Second, In a churn constructed and operating substantially as described, I claim the aperture, D, in the head, A', in combination with the plug, E, bar, E2, and projections or catches, F, as and for the purposes specified.

[The principal objects of this invention are to produce a churn by which the cream may be more quickly and effectually converted into butter, and provide means for preventing] the cream from leaking or oozing out at the aperture through which it is introduced into the churn.]

42,940.—Machine for Burring Wool and Ginning Cotton.—John Goulding, Worcester, Mass.:

I claim the combination of the cylinders, C and E, with the oiling cylinders, L and G, substantially in the manner and for the purpose described.

I also claim the combination of the cylinders, D C E F, spring plate, m, and adjustable hopper plates, g, substantially in the manner and for the purpose described.

I also claim, in combination with the adjustable hopper plates, g, the partitions, M N, substantially in the manner and for the purpose described.

42,941.—Breech-loading Fire-arm.—Henry Gross, Tiffin, Ohio:

I claim detaching or loosening the cartridge from a retractor formed on a breech plug, C, through the back action or movement of the lever, D', substantially as herein described.

Second, The open channel, a, in combination with the thrusting pin, g', or its equivalent, substantially as and for the purposes described.

Third, The lever latch or guard lever, k, applied in rear of the breech plug and operated by the catch, J, of lever, D', and spring, s, substantially as and for the purposes described.

42,942.—Composition for Artificial Ivory.—Julius Hackert, Bridgeport, Conn.:

I claim the above-described composition for artificial ivory mixed together, substantially in the manner and about in the proportions specified.

[By this composition a mass is formed which can be pressed or molded in any desirable shape, and which, when dry and cold, becomes as hard and tenacious as natural ivory.]

42,943.—Medicine Case.—E. H. Hance, Philadelphia, Pa.:

I claim a medicine case of the trapezoidal form and having the rows, c, of its containing vessels arranged above each other in the recessed manner in front, substantially as described, for the purposes specified.

42,944.—Railroad Switch.—C. H. Haskins, St. Louis, Mo.:

I claim, First, The combination of the treadles with the slotted rails at Y Y.

Second, The combination of the treadles at Y Y, a rod or rods, X X, and a triangular lever, E.

Third, The combination of the triangular lever, E, with the latches, F1 F2, and a rod or cross-bar, D, connecting the rails to be moved.

42,945.—Water Wheel.—Olney Harkness, Providence, R. I.:

I claim, first, A series of gates, a a a, arranged in pairs whether opposite to each other or otherwise, the several pairs being of unequal size, substantially as described for the purposes specified.

Second, I also claim in combination the friction carriages, Fig. 8, with its conical rolls, and the spindle, D, with its conical bearings, constructed substantially as described and for the purposes specified.

42,946.—Cigar Machine.—J. A. Heald, Carlisle, Mass.:

I claim, first, The rotating brush, B, constructed and operating for the purpose of smoothing leaves of tobacco, substantially as herein described.

Second, The combination of circular leaf-holding wheel, B1, with the brush wheel, B, substantially as described.

Third, The spring clamps or straps, a, in combination with the leaf-holder, B1, and circular brush wheel, B, substantially as described.

Fourth, The employment of a brush cylinder, B2, and concave or brush casing, B3, or their equivalents, substantially as and for the purposes described.

Fifth, Constructing the brush drum, B3, with annular flanges near its ends which bevel outwards, for the purpose of allowing the "filling" to escape from the cylinder, B2, more readily, substantially as described.

Sixth, The combination of rocking frame, E, and rocking shaft, E', substantially as and for the purposes described.

Seventh, The guide rollers, i i i, arranged and operating substantially as described.

Eighth, The feed rollers, h h h, arranged and operating substantially as described.

Ninth, The stationary rod, n, arranged and operating as herein described, or in any equivalent manner.

Tenth, The use of revolving brushes, S2 S3, for the purpose of smoothing the leaf and assisting in finishing the "point" of the cigar, substantially as described.

Eleventh, The conical rollers, S S S, arranged and operating substantially as and for the purposes herein described.

Twelfth, The curved table, T', constructed and operating substantially as herein described.

Thirteenth, The pressure roller, 2, when hinged to table, T, and operating substantially as described.

Fourteenth, The bristles or elastic points, 4, in combination with a finger guide, 5, constructed and operating substantially as herein described.

Fifteenth, The combination of pendulum arm, 7, weight and brush finger guide, 4 5, operating substantially as herein described.

Sixteenth, The combination of treadles, D F, with rocking frames, E E', substantially as and for the purposes herein described.

Seventeenth, Trimming the ends of cigars during the rotation of the same by means of circular knives applied to a reciprocating frame, and operating substantially as herein described.

Eighteenth, The notched plate, G4, treadle, G3, connecting rod, p2 and T, slotted cylinder, g3, in combination with stop pin, p, arranged and operating substantially as described.

Nineteenth, Confining the surplus end of the cigar between rollers, h i i, or their equivalents, during the operation of cutting off this end, substantially as described.

Twentieth, Starting the "wrapper" around the cigar by means of feed rollers which have independent bearings of those which support and rotate the body of the cigar, substantially as herein described.

Twenty-first, In a single machine I claim preparing the "filler" for receiving the wrapper or cover, and then applying the wrapper to it, substantially as described.

42,947.—Furnace for treating Slag.—Julius Hornig, Troy, N. Y.:

I claim the main portion, A, of the furnace in combination with the chamber, B, provided respectively with the inclined bottoms, a c, and gutter, d, in connection with suitable openings in the sides of the furnace to admit of the manipulating of the slag and the discharge of the more and less fusible portions of the same, substantially as set forth.

42,948.—Preserving Eggs and other Articles.—W. B. Ingersoll, New York City:

I claim the rack upon which the eggs, fruits, or other articles may be placed, resting upon one or more points, either for the purpose of immersing them in any suitable material, then raising them out of it, and allowing them to remain there to dry, or for placing the eggs, fruit, or other articles upon for drying after their immersion in the liquid.

I also claim a solution composed of gum dammar, rosin, and benzine or naphtha, for the purpose of coating articles to preserve the same.

[This invention consists in applying to the outside of the egg or shell, by immersion or otherwise, a fluid or liquid or any material that shall stick to and be absorbed by the shell, in such a manner that it completely covers the pores of the shell, and forms a coating impervious to the atmospheric air or to any other agent capable of producing or aiding in the decomposition of the organic constituents of the egg.]

42,949.—Barrel and Keg.—Eder Johnson, Jr., & Geo. W. Ansly, Cleveland, Ohio:

We claim, first, Forming the body of the barrel of corrugated sheet metal, the corrugations being such as to give the barrel the desired bulge in the middle, and enfolding the corrugations upon each other at each end as described, and securing them in such position by soldering, as and for the purpose specified.

Second, We claim the chine hoop, C D, when constructed as described, and securing the same in place by means of the metallic straps, E, as and for the purpose herein set forth.

42,950.—Slide Valve for Steam Engines.—James Kershaw, Paterson, N. J.:

I claim a balanced steam slide valve when constructed of two principal parts in the manner shown and described; that is to say, the box-like chamber, or its equivalent, on the back of the lower portion or valve proper, and the corresponding follower on the lower side of the upper plate fitting therein, and regulated by the screw, b, the spring, a', and the india-rubber packing, a, as shown, when combined together, and with the parallel surfaces of a valve chest, on purpose to produce a steam slide valve working in an equilibrium of pressure, as set forth.

42,951.—Clothes-pincer.—Henry Kewley, Port Huron, Mich.:

I claim the wedge sliding in the groove and the closing of the jaw by means of the sliding wedge, and thereby grasping firmly in the jaws the clothes in the boiler and thus enabling the washerwomen to remove them from the boiler without difficulty or danger.

42,952.—Making Water and other Pipe.—Henry Knight, Brooklyn, N. Y.:

I claim the guided centering bar, B, with a conical enlargement, B', made fast upon it, the said bar and cone moving together, substantially as and for the purpose described.

42,953.—Water-proof Fabric.—Robert Liddell, Thompsonville, Conn.:

I claim the combination of linseed oil and plumbago or black-lead with the substance or texture of the cloth, substantially as and for the purpose set forth.

I also claim the combination of a mixture of linseed oil and japan varnish with cloth saturated with a mixture of linseed oil and plumbago or black-lead, substantially as and for the purpose set forth.

42,954.—Lock.—Marshall T. Lincoln, Washington, D. C.:

I claim, first, Constructing locks for house or other doors so as to be attached to the door-jamb, substantially in the manner and for the purpose specified.

Second, The levers, B and C, the one being operated from the inside, and the other from the outside, of the room, constructed and operating substantially as set forth.

Third, The regulating slide bolt, D, constructed and operating substantially as herein set forth.

Fourth, The combination and arrangement of latch, B, and slide bolt, D, as set forth.

Fifth, The combination of a key-bolt, G, with the slide bolt, D, for the purposes herein set forth.

Sixth, The combination and arrangement of the tumblers, H, key-bolt, G, and slide bolt, D, for the purposes specified.

Seventh, The cam, E, constructed and operating substantially as specified and for the purposes set forth.

Eighth, The lock-shell, A, and partition, a, constructed and operating substantially as specified, and for the purposes herein set forth.

42,955.—Stop for Skates.—Joseph Lyon, Newark, N. J.:

I claim notching the bottom of the runner of the rocker skate near the heel so that the skater may stop quicker than without this improvement.

42,956.—Atmospheric Governor.—Benjamin Mackerley, Paint Post-office, Ohio:

I claim, first, The adjustable stationary valve, I, applied in combination with the hole, b, in the piston, D, of an atmospheric regulator, substantially as and for the purpose herein specified.

Second, The lever, E, and brake spring, g, applied in combination with the piston of the atmospheric regulator, substantially as and for the purpose herein described.

42,957.—Grain Dryer.—Sylvester Marsh, Chicago, Ill.:

I claim, first, The method of drying grain in upright chambers by causing the grain to travel in a direction contrary to the ascending currents of heated air or gases, the chamber being arranged to expose a large superficial area of grain in thin layers between perforated metallic plates to the action of the heated air, substantially as shown and described.

Second, The arrangement of the grain chambers in pairs, the two chambers having between them a hot-air flue, having no other exit than through the chambers described.

Third, In combination with the drying chambers and hot air flues arranged as described, I claim the employment of a hopper to supply the grain to the chamber and a slide valve to regulate its discharge under such an arrangement, as that the same shall be self-acting and regulating the supply and discharge of grain, in the manner and for the purposes set forth.

42,958.—Locomotive Wheel.—Mary Jane Montgomery, New York City:

I claim, first, The application of a corrugated beam of metal, constructed substantially as described, to wheels of locomotive engines, cars, vehicles, and carriages of all kinds.

Second, The combination of the aforesaid corrugated metal beam, C, with the metallic tire, D, in the construction of wheels of locomotive engines, cars, vehicles, and carriages of all kinds, substantially as described.

42,959.—Black-lead Crucible.—George Nimmo, Jersey City, N. J.:

I claim the manufacture of crucibles from calcined plumbago, in the manner and for the purposes specified.

42,760.—Spring Rocking-horse.—C. B. Northrup, New York City. Ante-dated May 30, 1864:

I claim the spiral spring, G, fitted on a rod, F, which is attached to a rock-shaft E, in the framing, C, the rod, F, working in a hole, d, in the horse, and said parts being used with or without the check spring, D, substantially as and for the purpose herein set forth.

[This invention consists in applying a spiral spring to the horse and framing thereof, in such a manner that an agreeable rocking motion will be produced by a moderate effort of the rider, and at the same time a more durable and economical article obtained than those hitherto constructed, and one not attended with any danger to the rider in case of the breakage of any of the parts.]

42,961.—Wrench.—W. C. Noyes, Seymour, Conn.:

I claim a screw wrench having its stationary jaw, B, at one end of the handle, A, and parallel with it, and provided with a movable jaw G, fitted on a bar, D, and operated by a screw, E, all arranged substantially as set forth.

[This invention consists in having the two jaws of the wrench at the end of the shank or handle, and the movable jaw arranged in such a manner that it is moved or adjusted in a line at right angles with the shank or handle, whereby a very strong and durable wrench is obtained, and one in which the leverage power is not diminished under any adjustment of the movable jaw, or at any point within the scope of its movement.]

42,962.—Automaton Dancer.—William Nunns, New York City:

I claim the tripping platform, A, in combination with the piano-forte action, E F, and dancer, G, constructed and operating in the manner and for the purpose herein shown and described.

[This invention consists in the application of a rising and falling platform connected to a vertically sliding rod, and operated by a piano-forte action of any convenient construction in combination with a jointed figure of wood, or other suitable material, suspended over said platform in such a manner that on touching the key the platform assumes a uniform rising and falling motion, and is thrown in contact with the feet of the jointed figure, and by repeating the blows on the key said figure assumes a dancing motion of the most comical kind.]

42,963.—Stanchion for Cattle Stalls.—Charles E. Petrie, Cherry Valley, Ohio:

I claim the construction of the movable stanchions, 1 2 3 4, in combination with the blocks, F F F F', operated by means of the bars, H' H and K K, and the levers and chains, i i L L G G G G m m m m, when the same are constructed (in the aforesaid combination and for the purposes set forth) as described.

42,964.—Washing Machine.—Z. B. Rice, Boston, Mass.:

I claim the combination and arrangement of the bow-lever, K, with the dasher, I, and rubbing-board, F, substantially as set forth and for the purpose described.

42,965.—Saw-mill.—Joseph D. Richardson, Elizabethtown, Ky.:

I claim the arrangement of the slides, D D and C C, braces, R R, and H H, in combination with the eccentric, I, pitman, F, connecting arm, G, rocking shaft, S, and the connecting parts giving a vibratory motion to slides, D D, and the upper end of the saw, substantially as described and for the purposes as set forth.

42,966.—Forming Seams to Sheet-metal.—F. Roys, East Berlin, Conn.:

I claim, first, The wheels or rollers, C C, adjustable bars, H H', spiral plate, J, flange, K, on the bar, H', and the closing rollers, L L, all arranged and applied to a mounted frame, to operate substantially as and for the purpose set forth.

Second, The adjusting of the bars, H H', plate, J, and flange, K, by having the same connected with a plate, F, through which a screw, G, passes, substantially as described.

Third, Operating the closing rollers, L L, through the medium of gear wheels, N N, and a crank, O, when said rollers are arranged and applied as shown, and used in connection with the bars, H H', spiral plate, J, and flange, K, for the purpose herein specified.

[This invention relates to a machine for forming the joints or seams of sheet-metal roofing plates, when the latter are laid upon the roof, and it consists in the employment of two guide wheels or rollers, bending or forming plates, and two closing wheels, arranged and applied to a mounted frame.]

42,967.—Machine for bending Edges of Sheet-metal.—F. Roys, East Berlin, Conn.:

I claim, first, The raising or lifting plates, E, in connection with the angle plates, G, and twisted or curved plates, H, all being attached to a mounted frame and arranged to operate in the manner substantially as and for the purpose herein set forth.

Second, The guides or gages, a*, adjoining the plates, E, when used in connection with the plates, G H, for the purpose specified.

Third, The adjustable frame or platform, A, composed of two parts, a a, attached to bars, B B, which are connected together by bars, c, all arranged as shown, for the purpose of admitting the plates, E G H, being adjusted to suit the width of the roofing plates, as set forth.

[This invention relates to a useful machine for bending the edges of sheet-metal roofing plates when applied to the roof, said machine being designed for preparing the plates to form locks or joints, by which they are connected together.]

42,968.—Cover for Cooking Stoves.—Jacob Shavor and A. C. Corse, Troy, N. Y.:

We claim the employment of the stove or range boiler-hole cover, A, constructed with downward projections, C, and with apertures in combination therewith, in the manner substantially as and for the purpose herein described and set forth.

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42,969.—Water Economizer.—Edward J. Stearns, Catonsville, Md.:

I claim the interposition between the supply or service pipe and the outlet whence the water is received or drawn off, of an air vessel so applied, and a cock or faucet so constructed, that by turning the cock to one and another of two positions the vessel may be alternately filled and discharged by the reaction or expansion of air compressed within it while filling, and that no more water than the contents of the said vessel can be withdrawn at a time without turning the cock or faucet, substantially as herein specified.

[The object of this invention is to prevent waste of water at hydrants, kitchen sinks, wash-stands, bath-tubs, water-closets and other hydraulic apparatus, by the accidental leaving open of the cocks or faucets of such apparatus.]

42,970.—Shaking Table for separating Ores.—Charles A. Stetefeldt, New York City:

I claim, first, The employment or use in a shaking table of two or more rotating beds or aprons arranged one above the other in the manner and for the purpose substantially as herein shown and described.

Second, The application of one or more inclined endless rotating aprons, C C', arranged in combination with the shoe, B, and with a shaking device acting in a direction opposite to that in which the apron or aprons move, substantially as and for the purpose specified.

[This invention consists in a shaking table provided with two or more rotating beds arranged one above the other, in such a manner that by their action the pulverized ore running down over them is separated automatically by the action of the machine, according to the different specific gravities of the constituents and that the separation can be continued to any desired degree, simply by increasing the number of rotating beds.]

42,971.—Photographic Camera.—John Stock, New York City:

I claim, first, The construction of the camera whether vitrified or of other material, with circular projections, S, in the manner and for the purpose substantially as set forth.

Second, I claim the construction of the plate-holder, C, with projecting ledge, a, and I also claim the plate-holder, C, projecting ledge, a, in combination with the hook, w, spring-catch, d, and lever, g, said spring-catch, d, working in suitable division notches or holes, made in the ledge, a, when combined and operating in the manner described.

Third, I claim the arrangement and use of the movable front plate, B, constructed as described.

Fourth, I claim in combination with a movable front plate, the arrangement of the plates of frames, M and N, or their equivalent acting in the manner and for the purpose described.

Fifth, I claim hinging the front plate, B, to the camera, irrespective of the kind and mode of hinging, for the purpose substantially as set forth.

Sixth, I claim moving the front plate, B, by means of a bolt, o, or its equivalent, whether passing from the front to the back, or from the back to the front of the camera box, as described.

Seventh, I claim the overhanging spring, n, attached to the top of the camera box, and acting against the back part of the plate-holder, in the manner and for the purpose specified.

Eighth, I claim holding and moving the front plate by means of one or more screws, substantially as described and set forth.

42,972.—India-rubber Tubing.—Frederick R. Taylor, New York City:

I claim the manufacture of the new article known as flock d india-rubber tubing.

42,973.—Wind Mill.—Jonathan Troop, Erie, Pa.:

I claim the regulating fans, D, with slotted guides, d, in combination with the shafts, C and a', and with the dogs, C, projecting from the edges of the sails, A, which are hinged to arms, a, all constructed and operating in the manner and for the purpose herein shown and described.

42,974.—Composition for staining Wood.—Marshall Turley, Council Bluffs, Iowa:

I claim the within-described composition for staining wood, made of the ingredients above specified and mixed together, substantially in the manner and about in the proportion set forth.

42,975.—Grain Drill.—S. E. Tyler, Horicon, Wis.:

I claim the rotary seed-discharging wheel, L, in connection with the rotary inclined tubes, O', cap, M, and hopper, L', all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to a new and improved broadcast seeding machine and it consists in the employment or use of inclined rotating tubes in connection with a rotating seed-discharging wheel.]

42,976.—Sewing Machine.—E. L. Wales, East Randolph, Mass.:

I claim so attaching a trimming knife to the throat-plate of a sewing machine, that the edge of the knife may be opposite, or nearly opposite the center of the throat, substantially as set forth and for the purpose described.

42,977.—Hat.—Wm. F. Warburton, Philadelphia, Pa.:

I claim the combination in the manufacture of hats of book-binders ornamented muslin with the outer covering of the hat, in the manner and for the twofold purpose specified.

42,978.—Device for bending Iron Bars for Trucks.—Robert B. Weaver, Steubenville, Ohio:

I claim the bed-piece, A, in combination with the clamp, B, formed of three parts connected together by hinges or joints, the levers, F F, racks, G, and the screw, C, or its equivalent, all arranged to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and useful machine for bending iron bars in proper shape for car-trucks, and it consists in the employment or use of a bed of the form in which it is designed to bend the bars, in connection with a jointed clamp, levers and a screw, or its equivalent.]

42,979.—Hydromotor.—Thomas Welham, Brownsville, Nebraska Territory:

I claim, first, The elastic cylinder, B, and its outside connection in combination with the driving shaft at the flange, E, by a connecting rod, C, as described.

Second, I also claim the flange, E, with its apertures, F, in combination with the connecting-rod, C, and the elastic cylinder, B.

Third, I also claim the construction of the slide, J, and levers, H, when arranged and combined as cut-offs, as herein described.

Fourth, I also claim the construction, arrangement and combination of the elastic cylinder, B, with its elastic feed and discharge pipes, G, and their cut-offs, H, when constructed, arranged and combined as herein described.

42,980.—Hydraulic Motor.—Thomas Welham, Brownsville, Nebraska Territory:

I claim combining two or more cylinders, each cylinder containing a screw propeller, the cylinders being connected together by channels or ducts, and each screw having a toothed wheel on its shaft gearing into the other and propelling a driving wheel, as herein described and for the purposes set forth.

42,981.—Machine for rolling File Blanks.—Milton D. Whipple, Cambridge, Mass.:

I claim the movable tongs, l, and a mechanism substantially as described for operating and governing the same, in combination with the rolls, C and D, operating in the manner substantially as set forth.

42,982.—Loom for weaving Hair Cloth.—Joseph S. Winsor, Providence, R. I.:

I claim, first, The spring nippers consisting of the jaws, B, and the wedge-formed tongue, C, or their equivalents, constructed and arranged to operate with reference to each other, substantially as described for the purposes specified.

Second, I also claim the combination of the spring nippers as above described with the stops, c e f, for controlling the opening and closing of the jaws at the proper time, for the purposes specified.

Third, I also claim the mode of operation substantially as specified by means of which the feeding fork, g, is made to plunge through a bunch or mass of hairs, for the purposes set forth.

Fourth, I also claim the mode of operation substantially as specified, by means of which, in case the feeding fork fails to select or the nippers to seize a length of hair for insertion in the web, the motion of the fork is arrested until the same shed of the warp is again opened for the purposes specified.

42,983.—Telescopic Gun Sight.—Daniel Wood, Rochester, N. Y.:

I claim the adjustment of several horizontal cross-hairs or lines in telescopic sights, at unequal distances apart, which distances shall be in ratio and representation of the fall of the ball or projectile, at the different distances for which each hair is arranged, substantially in the manner and for the purposes specified.

42,984.—Churn Dasher.—Baxter Wright, Cardiff, N. Y.:

I claim the employment of the vertically swinging beveled blades, C, in combination with the grooved bars, a a, the whole arranged and operating as herein shown and described.

42,985.—Manufacture of Sulphuric Acid.—L. Chandor, St. Petersburgh, Russia:

I claim, first, The employment or use of columns, D1 D2 D3, etc., of flasks made of stone-ware or clay, in combination with the kilns, A, substantially as and for the purpose specified.

Second, The use of coke, pumice stone, or other porous bodies in combination with the columns, D1 D2 D3, and kilns, A, for the purpose set forth.

Third, The caldrons, d e i, etc., and reservoirs, f h j, in combination with the columns, D13 D12 D11 D1, and kilns, A, all constructed and operating in the manner and for the purpose herein shown and described.

[The object of this invention is to facilitate the combination of the oxygen derived from nitrous fumes with the sulphurous acid gas derived from burning sulphur or roasting pyrites or other sulphuret, and to save all the nitric oxide and by reconverting it into peroxide of nitrogen render it fit for the oxydation of fresh charges of sulphurous acid gas.]

42,986.—Loom for weaving Corsets and Articles of Irregular Form.—Wm. P. Brown, New York City:

I claim, first, Causing the lay to gradually recede in the loom as the weaving proceeds for a certain distance without any operation of the "take-up" and afterward causing it to advance simultaneously or nearly so with the operation of the take-up, substantially as and for the purpose herein set forth.

Second, The employment between the reed and the take-up apparatus of a pair of jaws, M M', applied and operating substantially as and for the purpose herein set forth.

Third, The employment in a loom for weaving corsets or other goods of irregular shape, of a series of take-up rolls, e1 e2 e3, having a longitudinal profile of irregular form corresponding with the irregularity of the form of the goods, and operating substantially as and for the purpose herein specified.

Fourth, Transmitting motion from the hooks, W W', to the driving rack, S, of the shuttle, operating mechanism by means of a pulley or pulleys, T U, and four connecting cords or straps, x x' z z', applied and operated, substantially as and for the purpose herein specified.

Fifth, The guides, 23 and 24, and their connecting springs, 25 and 26, applied within the shuttle, to operate substantially as and for the purpose herein specified.

[The object of this invention is the weaving by power in a continuous or uninterrupted manner, of corsets or other articles or goods having more fullness in some parts than in others. In order to do this the warp is so operated by a jacquard machine or other suitable means that in places where fullness is required, the weft or filling is deposited by the shuttle through but a portion of the warp, which portion is increased or diminished as the successive picks of filling are inserted, according to the form of fullness desired.]

42,987.—Process of extracting Oils, etc., from Vegetable and Animal Substances.—Thomas Richardson, Newcastle-upon-Tyne, England, and J. J. Lundy, Leith, Scotland, and Robert Irvine, Mid Lothian County, Scotland:

We claim the mode of extracting the fixed oil contained in vegetable substances, such as seeds and nuts; and in animal substances, such as fish, the carcases of animals and refuse animal matter, by means of the solvent properties of the volatile hydro-carbons, hereinbefore mentioned.

42,988.—Treating Brine and Salted Meats to remove the Salt.—Alexander Whitelaw, Glasgow, Scotland:

I claim the application to the brine from salted flesh and fish of the process known as "dialysis," substantially in the manner set forth, so that the nutritive constituents of the brine are separated from the saline matters, and can be used as set forth.

[A full description of this process, and its advantages, will be found on page 309 of the current volume of the SCIENTIFIC AMERICAN.]

42,989.—Binding-guide for Sewing Machines.—Samuel B. Cochran, Clapham, England, assignor to James Wilcox, New York City:

First, I claim the construction of spring binding-hooks out of one piece of metal in such manner that by compressing the spring the hooks will hold the material to be bound by pressure on opposite sides but not oppositely to each other.

Second, In combination with spring binding-hooks, constructed as described, I claim a presser plate acting in conjunction with or in lieu of the ordinary presser-foot of sewing machines, as and for the purposes described.

Third, In combination with spring binding-hooks and presser plate constructed as described, I claim forming in the presser plate a slot arranged for the double purpose of receiving the spring blade of the upper hook at variable points of adjustment, as to width of the binding, and of causing the spring to rise and fall with the presser plate, as set forth.

Fourth, I claim enlarging the presser plate to extend over the needle hole in the sewing machine and forming therein a longitudinal opening for the needle to work through under various adjustments of the binder, as set forth.

Fifth, I claim combining with the spring binding-hooks and presser plate a rigid body grooved underneath to contain the blade of the lower hook and provided with a curved guide for giving the binding the proper curvature previous to engaging it into the hooks and with a longitudinal slot for adjusting of the binder to various widths of binding, substantially as set forth.

Sixth, I claim the attachment of the spring pressing plate of the binder to the body so that it will move with the body when being adjusted to different widths of binding.

42,990.—Machine for trimming the Bowls of Tobacco Pipes.—D. A. Dickinson (assignor to Tobacco Pipe Company), Baltimore, Md.:

I claim the combination of the movable adjustable clamp, the rotating feeding crank disk, and the revolving tool, when constructed and operating substantially as herein set forth.

42,991.—Machine for making Tobacco Pipes.—D. A. Dickinson (assignor to Tobacco Pipe Company), Baltimore, Md.:

I claim the arrangement of the clamp or blank-holder and the tools with their shafts in their relation to each other, and operating as herein recited.

42,992.—Ice and Snow-fender for Roofs of Buildings.—L. Howe, assignor to himself and R. R. Shepard, Worcester, Mass.:

I claim the application of ice and snow-fenders to the roof of a building in such a manner that the fender shall be free to rise and fall with the freezing and thawing of the ice and snow on the roof, substantially in the manner and for the purposes described.

I also claim the shoes, C, in combination with the main wires, A, and fender-rods, D, substantially as herein described.

I also claim the combination of the shoes, C, main wires, A, cross wires, E, and fender-rods, D, substantially as herein described.

I also claim the peculiar construction of the shoes, C, by which I am enabled to couple the different sets of fender-rods, and avoid long and unwieldy rods substantially in the manner herein described.

42,993.—Nail Machine.—Rock Lario, assignor to Leyfort, McManus & Co., Reading, Pa.:

I claim discharging the finished nail from the dies, by means of the arm, I, operating within a slot in the bed-piece, as set forth, and actuated by any moving part of the machine, as specified.

42,994.—Fastening for Doors, Stair-rails, Lasts, etc.—William Sellers, assignor to Ann Rammage, New York City:

I claim the segment bolt, B, provided with taper or wedge-shaped flanges, g g, and fitted within the portion, A, of the lock, in connection with the portion, D, provided with a recess, i, to receive the bolt, and having a segment slide, a*, substantially as and for the purposes set forth.

I also claim having the portion, A, constructed of two parts, a a, with a screw, b, cut on their exterior to admit of the bolt, B, being readily adjusted in A, and also to admit of A being readily fitted in the part, E, designed to receive it.

I also claim fitting or securing the portion, D, of the lock in the part, E', by means of the screw, h, on its exterior, as set forth.

I further claim the cleat, k, on the outer ends of the parts, a a, of the portion, A, of the lock, in combination with the groove or recess, l, in the outer end of the portion, D, as and for the purpose specified.

42,995.—Bee-hive.—Reuben Gipson, Shelby, Ohio:

I claim, first, The corrugations, e, in their specific form and relation, when situated on the under side of the upper bar of the comb frames, for the purpose specified.

Second, The special arrangement of the adjustable comb-frames, provided with the corrugated upper bar, as described, and corresponding with the inclined bottom in connection with the door hinged as described, when used conjointly, as and for the purpose set forth.

42,996.—Ventilating Opening for Tents.—Richard B. Pullan, assignor to Jessie D. Pullan, Cumminsville, Ohio:

I claim the combination of the gore pieces, d f g, braces, p, and bar or leg, A', constituting a dormer ventilating opening, substantially as described and shown.

42,997.—Treating Auriferous and Argentiferous Ores.—Louis E. Rivot, Paris, France, assignor to Jacques Gaillardon, San Francisco, California:

I claim, first, The roasting by means of superheated steam of auriferous and argentiferous ores, when combined or mixed with pyritus of iron or copper, substantially as set forth.

Second, The general arrangement and construction of reverberating furnaces adapted for the roasting of ores by means of steam superheated as herein-before described.

Third, The process of amalgamation without re-agents, substantially as herein-before described, whereby roasting of ores may be rendered practical and economical as set forth.

42,998.—Lamp.—Andrew J. Ritter, Rahway, N. J.:

I claim the operation and combination of the globe or chimney, D, slide, C', perforated or vented cylinder, B, springs, I I, and long and tapering tube, E, or their equivalents, for the several purposes herein substantially set forth and specified.

RE-ISSUES.

1,679.—Accountant Labels for Periodicals, etc.—Robert Dick, Buffalo, N. Y. Patented Oct. 4, 1859. Antedated July 26, 1858:

I claim, first, The method of keeping accounts current by means of successive impressions taken from a form or forms of type, or its equivalents, into which the current transactions of any business are to be type-posted from time to time; in producing the novelty of a metallic or type ledger, so representing all accounts, and so incorporating all current business transactions, as to render the further use of written ledgers unnecessary, printed versions of the metallic ledger being used instead, for counting-room and all similar purposes.

Second, I claim the printed ledger or record herein described, consisting of a succession of impressions or versions taken from the type or metallic ledger, at regular or irregular intervals, each impression or version showing the several transactions or the balances of each individual account, substantially as herein described. This claim includes the use of any such impression or impressions for ledger or counting room purposes.

Third, I claim the use of all such impressions for rendering or transmitting accounts, or for addressing or directing newspapers or other periodicals to subscribers or others, whether applied to the papers directly from the type, or intermediately by impressions previously taken, or otherwise, substantially as described.

Fourth, I claim, in connection with newspaper and all similar business, the combination, in print, of a subscriber's address with a statement of his subscription account in the form of the time to which it is paid, or otherwise, substantially as herein described.

Fifth, I claim the method of cutting off from a printed column or web of columns such addresses and accounts, and affixing them separately to newspapers or other periodicals, or to cards and envelopes, by means of a machine, substantially as herein set forth.

Sixth, I claim the machine herein mentioned, and its uses as shown, operating substantially as described.

1,680.—Brewing.—Ludwig Haecker, Altenburg, Hungary. Patented July 1, 1862:

I claim the within-described process of producing maize beers, by treating maize mixed with barley malt, about in the proportion, and substantially in the manner set forth.

1,681.—Buckle.—O. L. Hopson and H. P. Brooks, Waterbury, Conn. Patented May 12, 1863:

I claim a buckle, the prongs of which are of one piece of wire, bent and applied to a bar of the frame, substantially as described, and prevented from sliding on the bar by means of holes, notches, or other suitable stops, formed in or on the bar as herein set forth.

1,682.—Harvester.—Dayton T. Morgan and William H. Seymour, assignees of Palmer & Williams, Brooklyn, N. Y. Dated July 1, 1851. Re-issued April 10, 1855; again re-issued, Jan. 1, 1861:

We claim the combination of the cutting apparatus of a harvesting machine with a quadrant-shaped platform arranged in the rear thereof, and a sweep-rake, operated by mechanism in such manner that its teeth are caused to sweep over the platform in curves when acting on the grain these parts being and operating substantially as herein before set forth.

We also claim the combination of a quadrant-shaped platform, a sweep-rake operated by mechanism, which causes the rake to move in alternately opposite directions, an inclined rail to raise the rake, and a switch, these parts being and operating substantially as herein-before set forth.

1,683.—Reaping Machine.—Dayton S. Morgan, assignee of W. H. Seymour, Brockport, N. Y. Patented July 8, 1851. Re-issued July 10, 1860:

I claim, first, The combination in a harvesting-machine of the cutting apparatus (to sever the stalks) with a reel and with a quadrant-shaped platform located in the rear of the cutting apparatus, these three members being and operating substantially as set forth.

Second, The combination in a harvesting machine of the cutting apparatu with a quadrant-shaped platform in the rear of the cutting apparatus, a sweep-rake, mechanism for operating the same, and devices for preventing the rise of the rake-teeth when operating on the grain, these five members being and operating substantially as set forth.

1,684.—Cooking Stove.—Philo P. Stewart, Troy, N. Y. Patented Jan. 18, 1859:

I claim, first, The supplying of a continued current of air, heated by the front plate of the fire-box or chamber, and in a flue or space immediately in front of the same, and without the aid of any intervening plates, to the oven of a stove in which the oven is at the rear of the fire-chamber, and at the same time extending under and beyond it so as to include the said flue or space, and permit the said heated air to freely enter the said oven, in the manner and for the purposes substantially as herein described and set forth.

Second, I also claim, in a stove constructed with an oven and fire-box, or chamber, substantially like the one herein-above described, the making the front plate to open with the doors, k, and the attaching an apron in front so as to hold or receive a kitchen or other roaster, substantially as specified, so that the heat radiated by the front plate of the fire-box or chamber, shall be aided by the heat radiated by the oven plates, in the manner and for the purposes substantially as herein described and set forth.

Third, I also claim the employment of the additional or extra bottom, v, in combination with the three-flue bottom of a cook-stove (and with space between the same), in the manner substantially as and for the purpose herein described and set forth.

Fourth, I also claim the employment of the additional or extra back, u, in combination with the ascending and descending flues at the back end of the oven, in the manner substantially as and for the purposes herein described and set forth.

Fifth, I also claim the boiler having a removable top or cover and two inclined flues, which are separate at the lower end, and unite into one at the top, so as to connect with the pipe leading to the chimney, substantially as and for the purposes herein described and set forth.

1,685.—Stove Grate-bar.—Philo P. Stewart, Troy, N.Y., assignee of George W. Gardner, Albany, N. Y. Patented Nov. 18, 1851:

I claim, first, the detaching of cinders, clinkers, or ashes from coals

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or solid burning fuel by means of parallel grate-bars, having an oscillating or vibrating motion in a horizontal plane, imparted there to by means of a frame or yoke and lever, or equivalents therefor, in the manner substantially as herein described and set forth.

Second, I also claim the employment of parallel grate-bars so constructed, arranged, and combined with a frame or yoke, as to be operated or vibrated in a horizontal plane, by means of a lever, substantially as herein described and set forth.

1,686.—Manufacture and refining of Iron.—Christian Shunk, Youngstown, Ohio. Patented Feb. 12, 1856:

I claim, first, The manufacture and refining of crude iron by the several processes herein set forth and described.

Second, Refining cast-iron through compressed air by diffusing the same, so as to permeate the liquid mass of the iron.

Third, The employment and application of common salt as stated. And these claims I make jointly and separately, in the manner and for the purposes substantially as specified.

1,687.—Washing Sand.—L. M. Speer, Belle Vernon, Pa. Patented Aug. 20, 1861:

I claim, first, An apparatus for washing sand, which is so constructed that the sand will be elevated through a body of water, or bath, and at the same time receive a zig-zag or undulating movement, and thereby caused to deposit its impurities into said bath, substantially as described.

Second, An inclined sluice-trough, in combination with an inclined screw elevator or elevators, and one or more water-baths, operating substantially as described.

Third, Conducting the water used in washing the sand from a main trunk, H, or its equivalent, through an inclined sluice, which is so arranged as to received the sand from elevator, G, and to deposit both the sand and water into suitable baths or receptacles arranged beneath said sluice, substantially as described.

1,688.—Manufacture of Flocked Fabrics.—The Simpson Water-proof Manufacturing Company, New York City, assignees of Edwin L. Simpson, Monroe, Conn., by mesne-assignments. Patented March 24, 1863:

I claim covering in excess a previously prepared surface with flocks, or their equivalent, rolling or otherwise pressing the same, and afterwards removing the excess, substantially as and for the purpose specified.

1,689.—Cutting Hay for Pressing.—C. Waste, assignee of Orson and Chas. Waste, Cameron, Ill. Patented Jan. 26, 1864:

In a machine for pressing and cutting hay, preparatory to pressing it into bales—

We claim, first, the so arranging and combining two pressure rollers with two side pieces or guide-plates, R R, in a closely fitting joint at the ends of the rollers, or other equivalent device, as that the hay is prevented from spreading laterally under the heavy pressure of the rollers, and the hay to be prepared for pressing is thereby fed through and crushed so as to break the stems and close the hollow in the interior of the straws, and delivered on a receiving table in sheets, and thus fitted to be more compactly pressed into bales, substantially as described.

Second, We claim the so arranging and combining two pressure rollers with two strips running up in front and between the rollers, or other equivalent device, as that the hay is prevented from clogging the rollers, substantially as described.

Third, We claim the combination of the rollers, A A, with a knife working periodically, so connected and geared to the rollers as to cut the hay in proper lengths for packing, substantially as set forth.

Fourth, We claim the combination and arrangement of the catch, F, with the weight, E, and knife, C, substantially as and for the purpose specified.

Fifth, We claim also the combination of the knife, C, with a grooved projection, M, substantially as set forth.

EXTENSION.

Machine for shearing Cloth.—Amasa Woolson, Springfield, Vt. Patented May 28, 1850:

I claim, first, A flexible rest, constructed substantially as herein above described.

Second, Making the rest susceptible of extension on each or either end, by combining with the ordinary stationary rest, and on each side thereof a flexible and movable rest, as herein-above specified.

Lastly, I claim making an extension or flexible and movable rest, self-operating, or so as to be changed by the cloth itself in its passage through the machine, all as herein above-set forth.

PATENTS

GRANTED

FOR SEVENTEEN YEARS!

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are so icited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three ast ex-Commissioners of Patents:—

MESSRS. MUNN & Co.:—I take pleasure in stating that, whi e I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F. and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting or writing to MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities of the examination and comparison of reference models, rawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charges is generally dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATENTS.

Messrs. MUNN & CO. are very extensively engaged in the preparation and securing of patents in the various European countries. In the transaction of this business they have offices at Nos. 66 Chancery lane, London, 29 Boulevard St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the Rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row New York.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as the fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

Binding the "Scientific American."

It is important that all works of reference should be well bound The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New Yo

Back Numbers and Volumes of the "Scientific American."

VOLUMES I., III., IV., VII., VIII. AND IX., (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference.

Subscribers should not fail to preserve their numbers for binding VOLS. II., V. and VI. are out of print and cannot be supplied. We are unable to supply any of the first six numbers of the current volume Therefore all new subscriptions will begin hereafter with the time the money is received

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Notes and Queries

W. L. B., of Ohio.—We should advise you to put a simple lignumvitæ step under the bottom of your shaft and transfer a portion of the weight, 6,000 pounds, from it to a hanging bearing set on four legs over the step, out of the water in some accessible place where it can be oiled. It may be in the second story if the shaft is so long. Make a collar bearing, that is turn the shaft and cut grooves in it at equal distances apart and of equal depth, so that it looks like a square thread, but without any pitch. Fit this to a brass box and you will have a substantial and smooth working bearing. It requires to be properly fitted however. When the wood bearing wears at the bottom arrange it so as to be keyed up.

A. B., of Cal.—Your circular quartz mill does not appear to embrace any patentable features. Inclined planes for lifting the beaters, which seems to be the principal feature of your improvement, have been used. When you write to us again please to give us your post-office address, in order that we may address you by letter.

M. C., of N. Y.—We think that if you will converse with the engineer who is superintending the construction of Fort Ontario, you will find that the materials have been selected from accurate knowledge of their properties, and that they are being placed in position in accordance with sound principles of engineering.

S. C., of N. J.—Ventilating fans have been used for hospital purposes. If your plan is better than others it is entitled to favorable notice, and you had better submit it to the surgeon-general of the army.

R. J., of Mass.—You can get an indicator spring by addressing the Novelty Iron Works, New York.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, May 25, 1864, to Wednesday, June 1, 1864:—

B. F. R., of Conn., $22; B. W. L., of Austria, $20; A. M. M., of N. Y., $20; C. S., of N. Y., $16; C. A. S., of N. Y., $45; H. C. R., of N. Y., $45; I. B., of Ky., $20; F. W. B., of N. Y., $10; F. I , of N. Y., $16; C. U., of N. Y., $50; R. T. M. W., of Vt., $16; H. J. V., of Belgium, $20; G. T., of Germany, $44; B. S., of Germany, $44; J. M., of Cal., $20; H. C. E., of N. J., $16; H. A. K., of N. J., $16; D. B. T., of Wis., $20; C. & O. B., of N. Y., $16; W. A., of Wis., $20; J. B. K., of Ill., $20; F. M., of Mo., $20; P. D., of N. Y., $16; A. J. L., of N. J., $16; A. R. F., of N. Y., $41; S. W. H. W., of N. Y., $16; J. W. R., of N. J., $20; C. D. B., of N. Y., $45; F. B. P., of N. Y., $25; B. W. McC., of Iowa, $40; A. F. T., of Ohio, $15; C. W. & P. W., of Ill., $25; H. C. D., of Mich., $15; H. E. F., of Conn., $25; I. L. S., of Maine, $15; B. & J., of Mass., $701; J. F., of Mich., $15; J. G., of R. I., $25; A. B., of Ill., $50; J. P., of N. J., $16; J. W. B., of Ill., $15; J. J. D., of N. Y., $183; T. B. F., of Mass., $25; A. S., of N. Y., $25; S. H., of Ill., $8; S. W. D., of N. Y., $25; J. & C., of Minn., $8; W. D., of Cal., $20; J. O. H., of Pa., $16; N. M., of Pa., $15; A. J. S., of Cal., $27; L. & L., of Ohio, $50; D. L., of Pa., $19; E. S. W., of Pa., $27; D. H. H., of Ohio, $96; T. F., of N. Y., $15; S. W., of Ill., $16; D. E. B., of Ind., $16; W. R. M., of Pa., $25; J. H., of Ill., $16; C. S. B., of Mass., $28; P. H., of N. Y., $16; P. & S., of Conn., $16; G. E. R., of N. Y., $25; P. C., of La., $15; M. H. B., of Ohio, $10; J. T., of Ill., $16; T. S., of Pa., $20; W. G. H., of Ind., $15; S. L. G., of N. Y., $16; D. K., of Ind., $7; R. & C., of Ill., $25; S. E. B., of Mo., $25; O. C. P., of N. Y., $84; D. S., of Cal., $41; S. W. H. W., of N. Y., $41; W. H. R., of N. Y., $25; E. W., of N. Y., $12; W. H. A., of N. Y., $60; H. & Co., of England, $44; J. S. T., of N. Y., $25; J. J. D., of N. Y., $25; R. D., of N. Y., $15; J. V., of N. Y., $25; H. C., of N. Y., $25; R. G. McD., of N. Y., $35; H. & G., of N. Y., $25; W. & R., of Cal., $10; C. E. S., of Maine, $25.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, May 25, 1864, to Wednesday, June 1, 1864:—

B. T. R., of Conn.; E. H., of N. Y.; S. W. H. W., of N. Y. (2 cases); R. G. McD., of N. Y.; L. & P., of Ohio (2 cases); C. S. B., of Mass.; E. L. W., of Pa.; C. & J., of Minn.; W. B. S., of Ill.; J. A. M., of Ill.; P. B. P., of N. Y.; S. H., of Ill.; A. S., of N. Y.; A. B., of Ill. (2 cases); J. G., of R. I.; S. W. D., of N. Y.; G. E. R., of N. Y.; T. B. F., of Mass.; D. H. H., of Ohio; A. M., of N. J.; J. J. D., of N. Y.; B. & L., of N. Y.; H. C., of N. Y.; R. D., of N. Y.; J. J. D., of N. Y.; J. V., of N. Y.; J. L. T., of N. Y.; W. H. A., of N. Y. (2 cases); O. C. P., of N. Y. (2 cases); G. F. J. C., of N. J.; J. H., of N. Y.; G. A. S., of N. Y.; E. C. S., of Maine.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

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FOR SALE.—ONE HUGHES' PATENT ATMOSPHERIC Trip Hammer. New, in good order, and very cheap. It is run by an 8-inch belt, and can be made to strike any weight of blow between 5 lbs and 30,000 lbs. Enquire of D. A. MORRIS, Rockaway, N. J. 24 2

THE PATENT KNIFE-CLEANER.—I WANT HARDWARE Dealers in all parts of the country to understand that they cannot invest money in anything that will yield a larger profit than my Knife-Cleaners. I sell them for $8 a half gross, and $15 per gross; they retail easily at 25 cents. They are all cast-iron, and clean the knife across the blade. Try a lot. Hundreds have been sold in the past three months. Patented March 29, 1864. Address, inclosing 25 cents for circular and sample. EGBERT P. WATSON, Box 773, New York.

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REFERENCES.—"We authorize Snyder & Walter to refer to us." Sheppard, Seward & Co., 214 Pearl street; C. H. Voorhees, Banker, 48 Pine street; John McKewan, Importer, 55 Maiden Lane; J. Wilmot, 2 Bowling Green; H. D. Smith, Chemical Bank; J. W. Kirby, Metropolitan Bank; H. S. Arthur, Esq., British and American Exchange Broker's Company, 63 Wall street. Refer also, by permission, to B. H. Taylor, 8 Pine street; D. W. Brown, Esq., 117 Maiden Lane; and Wm. Elting, 67 Liberty street, New York. 1*

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MECHANICAL AND OUT-DOOR PHOTOGRAPHY.—GEO. G. ROCKWOOD, Photographer, 839 Broadway, New York, will, during the Summer months, give his personal attention to Photographing Locomotives, Machinery of all kinds, in shops if necessary, and to taking all kinds of out and in-door views, in any part of the country. Refers to W. G. Hamilton, Jersey City Locomotive Works; B. J. Burnett and C. Holmes, of the Novelty Works; J. M. Toucey, Hudson River Railroad; and others.
Plans copied to a scale. 24 4

AMERICAN MANUFACTURES.

"THE BISHOP GUTTA-PERCHA COMPANY," the only American manufacturers of pure Gutta-Percha Insulated Telegraph Wire for submarine cables, Office Wire, Electric Cordage, and Mining and Blasting Use, etc., respectfully inform their American friends and their customers, the telegraph community of the United States, that they are fully prepared, with ample means and materials, to furnish all the Submarine and other Telegraph Wire, insulated with pure gutta-percha, that may be required for use in this country, and on terms as reasonable as any foreign manufacturers. Apply to SAMUEL C. BISHOP, General Agent of the Bishop Gutta-Percha Company, Office 201 Broadway, New York. 24 4

TO OIL MANUFACTURERS.—PROCESSES TO MANUFACTURE and purify every kind of Oils. Drawings of Apparatus. Process to purify and deodorize fish oils, and transform them into illuminating and lubricating oils of the first quality, Analyses and Assays of Oils. Address Prof. H. DUSSAUCE, Chemist, New Lebanon, N. Y. 1*

LABORATORY OF INDUSTRIAL CHEMISTRY.—Directed by Prof. H. DUSSAUCE, Chemist. Advices on Chemistry, as applied to Arts and Manufactures, Agriculture, Metallurgy, Plans of Factories, Drawings of Apparatus, Chemical Fabrications, Analysis of Ores, Soils, Greases, Soaps, and Commercial Essays in General. Prof. H. DUSSAUCE has in his possession plans and drawings of Factories, and would send them to any person desiring their use. He will also give advices, informations, etc., on the following Arts:—Chemical Products, Galvanoplasty, Lighting and Heating by Gas, White and Color of Zinc and Lead, Glass, Pottery, China, Matches, Wines, Beers, and Liquors in general, Starch, Sugar, Dyeing and Calico Printing, Inks, Varnishes, Vegetable Colors, Candles, and Soaps of every description. For Consultations and Information address New Lebanon, N. Y. 1*

HISTORY, ART, POLITICS, BELLES-LETTRES, Poetry, Biography, Criticism, Narrative, Fiction, are constantly represented in the pages of the ATLANTIC MONTHLY.
This Thoroughly American Magazine is published monthly at THREE DOLLARS a year; single copies 25 cents. Liberal reduction to clubs. Send 25 cents for a specimen and circular.
1 TICKNOR & FIELDS, Publishers, Boston.

ARMY CLOTHING AND EQUIPAGE OFFICE, Cincinnati, Ohio, May 26, 1864.

PROPOSALS ARE INVITED BY THE UNDERSIGNED until Monday, June 13th, 1864, at 2 o'clock P. M., for furnishing this Department (by contract) with—

Army Blankets, wool, gray (with the letters U. S. in black, 4 inches long, in the center), to be 7 feet long and 5 feet 6 inches wide, to weigh 5 pounds each, of domestic manufacture.

To be delivered free of charge, at the U. S. Inspection Warehouse, in this city, in good new packages, with the name of the party furnishing, the kind and quantity of goods distinctly marked on each article and package.

Parties offering goods, must distinctly state in their bids the quantity they propose to furnish, the price, and time of delivery.

Samples when submitted, must be marked and numbered to correspond with the proposal, and the parties thereto must guarantee that the goods shall be, in every respect, equal to Army Standard, otherwise the proposal will not be considered.

A guaranty signed by two responsible persons, must accompany each bid guaranteeing that the bidder will supply the articles awarded to him under his proposal.

Bids will be opened on Monday, June 13th, 1864, at 2 o'clock P. M., at this office, and bidders are requested to be present.

Awards will be made on Tuesday, June 14th, 1864.

Bonds will be required that the contract will be faithfully fulfilled.

Telegrams relating to proposals will not be noticed.

Blank forms of proposals, contracts, and bonds may be obtained at this office.

The right to reject any bid deemed unreasonable is reserved.

By order of Col. Thos. Swords, A. Q. M. G.
24 2 C. W. MOULTON, Captain and A. Q. M.

ORDNANCE OFFICE,
WAR DEPARTMENT,
WASHINGTON, D. C., May 25, 1864.

Sealed Proposals will be received at this office until Tuesday, the 14th day of June, 1864, for 8-inch Columbiad Shot and 8-inch Mortar Shell, to be delivered in the following quantities, at the undernamed arsenals, viz:—

8-INCH COLUMBIAD SHOT.
At the Watertown Arsenal, Massachusetts, 4,000.
At the Watervliet Arsenal, New York, 4,000.
At the New York Arsenal, Governor's Island, N. Y., 6,000.
At the Alleghany Arsenal, Pittsburgh, 4,000.
At the St. Louis Arsenal, Missouri, 2,000.

8-INCH MORTAR SHELL.
At the New York Arsenal, Governor's Island, N. Y., 20,000.
At the Watervliet Arsenal, New York, 5,000.

These projectiles are to be made of the kind of metal, and inspected after the rules laid down in the Ordnance Manual; the tensile strength of the iron for columbiad shot to be not less than 25,000 lbs. per square inch, and for mortar shells not less than 14,000 lbs. per square inch. Drawings can be seen at any of the United States Arsenals. The projectiles are to be inspected at the foundry when cast, and are to be delivered at the Arsenals free of charge for transportation or handling.

Deliveries must be made at the rate of not less than one-tenth (1-10th) of the whole amount contracted for per week; the first delivery to be made on the 29th day of June, 1864.

Failure to make deliveries at a specified time will subject the contractor to a forfeiture of the number he may fail to deliver at that time.

Separate proposals must be made for the shot and shell.

Bidders will state explicitly the Arsenal, or Arsenals, where they propose to deliver, and the number of projectiles they propose to deliver at each place, if for more than one.

No bids will be considered from parties other than regular founders, or proprietors of works who are known by this Department to be capable of executing the work proposed for. Should any party obtaining a contract offer shot or shell other than those cast in his own foundry, they will be rejected, and the contract rendered null and void.

Bidders will enclose with their bids the written acknowledgments of their sureties over their own signatures.

Each party obtaining a contract will be obliged to enter into bond with approved sureties for its faithful execution.

Upon the award being made, successful bidders will be notified, and furnished with forms of contract and bonds.

The Department reserves the right to reject any or all bids if not deemed satisfactory.

Proposals will be addressed to "Brigadier-General George D. Ramsay, Chief of Ordnance, Washington, D. C.," and endorsed "Proposals for 8-inch Columbiad Shot," and "Proposals for 8-inch Mortar Shell."
GEORGE D. RAMSAY,
24 2 Brigadier-General, Chief of Ordnance.

ARMY CLOTHING AND EQUIPAGE OFFICE, Cincinnati, Ohio, May 26th, 1864.

PROPOSALS ARE INVITED BY THE UNDERSIGNED until Friday, June 10th, 1864, at 2 o'clock P. M., for furnishing this Department (by contract) with—

50,000 Shelter Tents, more or less, to be delivered within (60) sixty days from date, like sample made at U. S. Tent Manufactory in this city.

Knapsacks—Army Standard.

Canteens—Army Standard.

Ax Helves—like U. S. samples Nos. 1 and 2 (the former preferred).

Samples of which may be seen at the Office of Clothing and Equipage in this city.

To be delivered free of charge, at the U. S. Inspection Warehouse, in this city, in good new packages, with the name of the party furnishing, the kind and quantity of goods distinctly marked on each article and package.

Parties offering goods must distinctly state in their bids, the quantity they propose to furnish, the price, and time of delivery.

Samples when submitted, must be marked and numbered to correspond with the proposal; and the parties thereto, must guarantee that the goods shall be, in every respect, equal to Army Standard, otherwise the proposal will not be considered.

A guaranty, signed by two responsible persons, must accompany each bid, guaranteeing that the bidders will supply the articles awarded to him under his proposal.

Bids will be opened on Friday, June 10th, 1864, at 2 o'clock P. M., at this office, and bidders are requested to be present.

Awards will be made on Saturday, June 11th, 1864.

Bonds will be required that the contracts will be faithfully fulfilled.

Telegrams relating to proposals will not be noticed.

Blank forms of proposals, contracts, and bonds may be obtained at this office.

The right to reject any bid deemed unreasonable is reserved.

By order of Col. Thomas Swords, A. Q. M. G.
1 C. W. MOULTON, Captain and A. Q. M.

U. S. ORDNANCE AGENCY.
45 WORTH STREET, NEW YORK, May 24, 1864.

SEALED PROPOSALS in duplicate will be received until Saturday, June 4, 1864, at 4 o'clock, P. M., by this office for the supply of 30,000 Pairs Brass Spurs.

They are to be made in all respects as to material, workmanship and dimensions, in strict conformity with the standard sample which can be seen at this office.

They are to be delivered, free of charge to the United States at this office and here inspected, and none are to be accepted or paid for but such as are approved upon inspection.

Bidders will state in their bids the time in which they propose to make deliveries.

Each party obtaining a contract will be obliged to enter into bond with approved sureties for its faithful execution.

Failure to make deliveries at a specified time will subject the contractor to a forfeiture of the number he may fail to deliver at that time.

No bids will be considered from parties other than regular manufacturers, and such as are known to this Department to be fully competent to execute in their own shops the work proposed for.

The Department reserves the right to reject any or all bids if not deemed satisfactory.

Proposals will be addressed, properly endorsed, to "Capt. S. Crispin, Ordnance, U. S. Ord. Agency, No. 45 Worth street, New York."
23 2 S. CRISPIN, Capt. of Ordnance.

ARMY SUPPLIES.
OFFICE OF ARMY CLOTHING AND EQUIPAGE,
502 BROADWAY, NEW YORK, May 27th, 1864.

SEALED PROPOSALS WILL BE RECEIVED AT this Office until 12 o'clock, M., on Tuesday the 7th of June next, for furnishing by contract, at the Depot of Army Clothing and Equipage in this city,—

Infantry Trousers.
Unlined Blouses.
Pegged Bootees.
Sewed Bootees.
Pegged Boots.
Sewed Boots.
Stockings.
Felling Axes.

Samples of which can be seen at this office. Bidders will state the quantity they wish to furnish, the shortest time in which they can make deliveries, and how soon they can complete the delivery of the quantity they bid for. They will submit, with their proposals, a sample of the article they propose to furnish.

A proper guaranty must accompany all bids for the faithful performance of a contract.

The United States reserves the right to reject any part or the whole of the bids as may be deemed for the interest of the service.

Proposals should be endorsed "Proposals for furnishing (here insert the name of the article bid for") and addressed to
1 LT.-COL. D. H. VINTON, Dy. Qr. Mr. Genl.

ARMY SUPPLIES.
OFFICE OF ARMY CLOTHING AND EQUIPAGE,
502 BROADWAY, NEW YORK, May 30th, 1864.

SEALED PROPOSALS WILL BE RECEIVED AT this office until 12 M., on the 7th of June next, for furnishing by contract, at the Depot of Army Clothing and Equipage in this city,—

Four Mule Wagon Harness complete.

Specifications for which can be seen at this office. Bidders will state the quantity they wish to supply, and the shortest time in which they can deliver it.

All proposals must be accompanied by a proper guaranty for the faithful performance of a contract.

The United States reserves the right to reject all bids deemed objectionable.

Proposals should be endorsed "Proposals for furnishing Harness," and addressed to
1 LT-COL. D. H. VINTON, Dy. Qr. Mr. Genl.

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SECTION III.—ON THE DIFFUSION OF VAPOR AND OTHER ELASTIC FLUIDS.—Elasticity defined; What the gaseous state is due to; Dalton's theory of mutual repulsion; Vapor an elastic fluid; Air; Gravity nothing to do with the mixing and diffusion of gases; Attraction of liquid atoms; Simple atmospheres; Compound atmospheres; Illustrations of diffusion.

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SECTION VI.—ON EBULLITION.—Surface bubbling; Incipient ebullition; "General mass" of a liquid; True cause and source of ebullition; Experiments on ebullition; The direct cause of bumping and explosions; Effect of the presence of vapor in excess of saturation; Experiments with vapor in excess of saturation; Vapor in water; What ebullition results from; Illustration of the stream of globules in ebullition; Illustrations of the tendency of vapor atoms toward a nucleus; Prevailing theories; Process, purpose, and utility of ebullition; Conclusion to be drawn from the facts of ebullition.

SECTION VII.—OF VAPOR IN WATER.—Classification of vaporized bodies; Gases or vapors in space; Experiments on vapor in water; Quantity of vapor; Experiment showing the actual existence of vapor in water; Experiment showing the formation and ascensional power of globules.

SECTION VIII.—ON CONDENSATION.—Cause and process of condensation; Condensation in the steam-engine; Experiment in condensation; Change in the electric condition of vapor atoms; Condensing and non-condensing engines; Vapor parting with heat; Steam ejected into a body of cold water.

SECTION IX.—OF THE VACUUM.—Action of cold water in producing a vacuum; Experiments on the vacuum; Assumed effect of water in depriving steam of its heat; Reciprocal relations of vapor ous and liquid atoms.

SECTION X.—ON EVAPORATION.—Distinction between the generation and escape of vapor; Experiment illustrative of vaporization and evaporation; Reduction of the temperature the result of the escape of vapor; Dalton's theory of diffusion; Experiments showing the loss of water by evaporation.

SECTION XI.—OF SPONTANEOUS EVAPORATION.—The involved character of the prevailing theory of spontaneous evaporation; Accumulation of vapor over the surface of water; Water evaporates in the form of vapor; Vapor present in water at all temperatures; Water does not evapora , but merely parts with its vapor.

SECTION XII.—ON BOILER EXPLOSIONS.—Explosions on the start. ing of engines; Flashing of water into steam a supposed cause of ex plosions; Agitation of water in the boiler a supposed cause of explo sions; Explosions equally attendant on an over or an undercharge of water in the boiler; Electricity as a cause of explosions; Decomposed steam as a cause of explosions; Overpressure as a cause of explosions; Explosions at ordinary pressure; Momentum of combined steam and water as a cause of explosions; Illustrations of steam and experiments showing the existence of the same quantity of steam in each cubic inch of a boiler; Examination and experiments on the sudden increase of pressure and risk of explosions; Boilers of the Great Eastern; Steam below the water line; Violent movement in boilers on starting engines; Deficient supply of water as a cause of explosions; Rarity of explosions in marine boilers; Franklin Institute experiments on explosions; Pressure of steam on the water in the boiler; Free caloric in the boiler.

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23 2 Industrial Publisher, 406 Walnut street, Philadelphia.

OFFICE OF ARMY CLOTHING AND EQUIPAGE,
No. 502 Broadway, New York, June 1st, 1864.

SEALED PROPOSALS WILL BE RECEIVED AT this office until 12 o'clock, M., on Tuesday, the 7th of June, for Baling Army Blankets until the 1st of December next, the contractor to furnish all materials necessary to bale the blankets in a satisfactory manner to this Department.

The services to be performed in the buildings of this Depot, the contractor to supply the machinery.

Further information can be obtained at this office.

Bidders will state the number of bales they can put up per week, and send with their proposals a proper guarantee, signed by two responsible persons, stating that if a contract is awarded to the bidder, they will enter into bonds for the faithful performance of the work.

The United States reserves the right to reject all bids deemed unreasonable.

Proposals should be endorsed "Proposals for Baling Blankets," and addressed to LT.-COL. D. H. VINTON, Dy. Qr. Mr. Genl.
1

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Improved Water Pressure Wheel.

There are many places where a simple and yet efficient water-wheel is preferable to any other motive power, for this class of prime movers requires but little attention and no continued oversight, such as is given to the steam engine. The wheel illustrated in these engravings is intended to be a convenient one for all purposes whatsoever, and the inventor claims precedence for it over others of its class. It is novel in its general arrangement, and is called by the constructor the "Diaphragm Pressure Wheel," for it acts by impact, or the dead weight and velocity of the current in the race, in the same general way that steam pushes on the piston of a steam engine. The construction and operation will be understood by referring to the following description:—The shaft, A, has four arms, B, which are forked at the ends and carry idler pulleys, C. These pulleys bear on a rubber diaphragm, E, which is attached to the case, F. There is also a scroll or case, G, having four or more inlet passages, H. The operation is as follows:—when the water enters the scroll it passes around to the openings just mentioned and strikes the inner face of the diaphragm, against which the pulley is resting, as in Fig. 2; this pulley is thereby forced around, and as each one in turn passes the water passage, an impulse is given which keeps up the first movement transmitted, and the machinery continues in motion; the water is then discharged from the case of the diaphragm through openings at the bottom, which are not shown. In some instances valves are placed in the inlet passages as shown at I; by means of these the water can be shut off at any point; and all four are connected together so as to stop or start the wheel as they are opened or shut. A patent was granted on this water-wheel through the Scientific American Patent Agency, to Jared W. Smith, of New Haven, Conn., on Oct. 6, 1863; for further information address him at that place.

Fig. 1

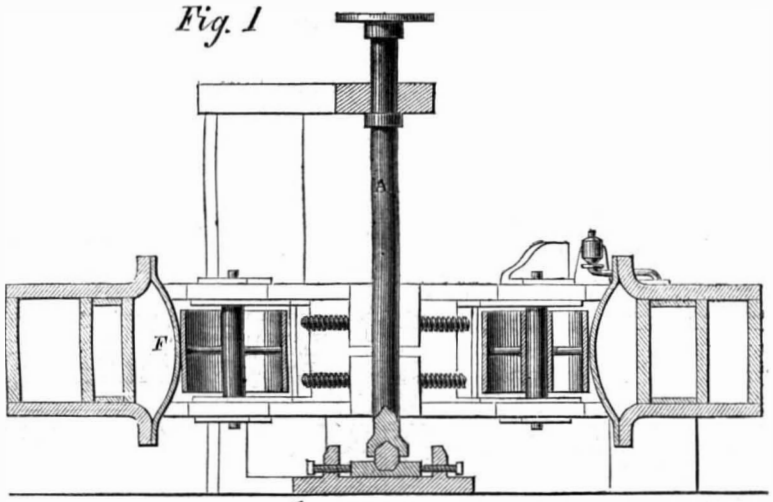
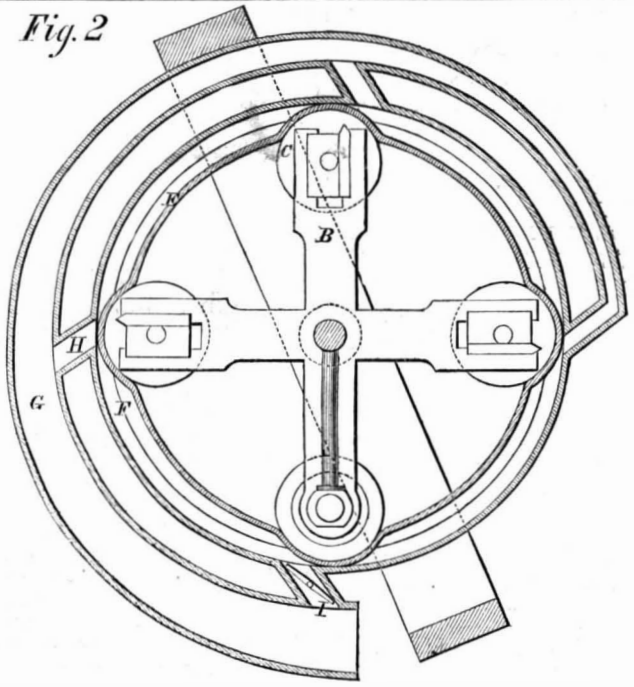


Fig. 2



SMITH'S WATER PRESSURE WHEEL.

Expansion Gear on Locomotives.

The history of variable expansive gear will prove interesting. It is uncertain when lap was first applied to the slide valve with a view to expansive working. Yet it is nevertheless certain that lap was often given to steam engine valves long before even 1830. In the French patents are many drawings of very early engines, in which the valves were moved by cams, and which had a lap at each end equal to the width of the steam ports. It is true that the cams were made to move the valves quickly, but even then some time was necessarily occupied in the traverse of the valve through the sum of the lap at both ends, and during this time the steam already in the cylinder must have been expanding. All the patents referred to dwell upon the importance of expansive working, and propose, variously, to cut off the steam at one-third, one-half or two-thirds of the stroke. Indeed, M. Hallette. of Arras, one of the earliest and ablest of the French mechanical engineers, constructed several steamboats for the Garonne, in 1828, and in his patent of that date he illustrates and describes the means which he employed to vary the point of cutting off the steam, while the boat was under way, at either one third, one-half, two-thirds, or three-fourths of the stroke. This was effected by gear connected with an expansion valve sliding upon a face on a plate just back of the main valve. In 1832 the late Mr. Richard Roberts patented a variable expansion gear, in which the throw of a separate expansion valve (sliding in a case at the back of the main valve) was varied by the now universally-used block adjustable at will upon a curved lever. When John Gray took up the subject of valve reform, in 1837, and after bringing out his "horse-leg" expansive gear, as it was called, it was still questioned, as it now is in America, if there was any virtue in expansion, and all the gain that was discovered was attributed by Mr. Woods to an earlier exhaust of the steam. In an old volume of the *American Railroad Journal* for 1832 (p. 673,) the editor gives some account of an engine, at that time just constructed in New York, which he had seen run across the yard of the maker's factory, a distance of 50 feet, and that eight such runs were made in 63 seconds, including stops. The reversing motion must, of course, have been very effective. A tolerably complete account of this engine from another source states that it had the link motion, and so circumstantial is the account that the distance between the eccentric rod joints, 9 inches, and the lap of the valves, $\frac{5}{8}$ inches, is given. Truly, the history of the locomotive will repay further research.—*Colburn.*

A MODEL for a fountain has been designed by Mr. Rosenthal, a sculptor of Hanover, representing a monkey holding a champagne bottle, of which he has imprudently drawn the cork, and which he vainly endeavors to stop. The champagne is represented by the different jets of the fountain bursting out in all directions. This is about as delicate a design as one in Stockbridge, Mass., where there is a fountain which represents a cat spitting on a dog.

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